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Reagan's EPA: Balancing Rules With Budget

ISSN 0043-1753

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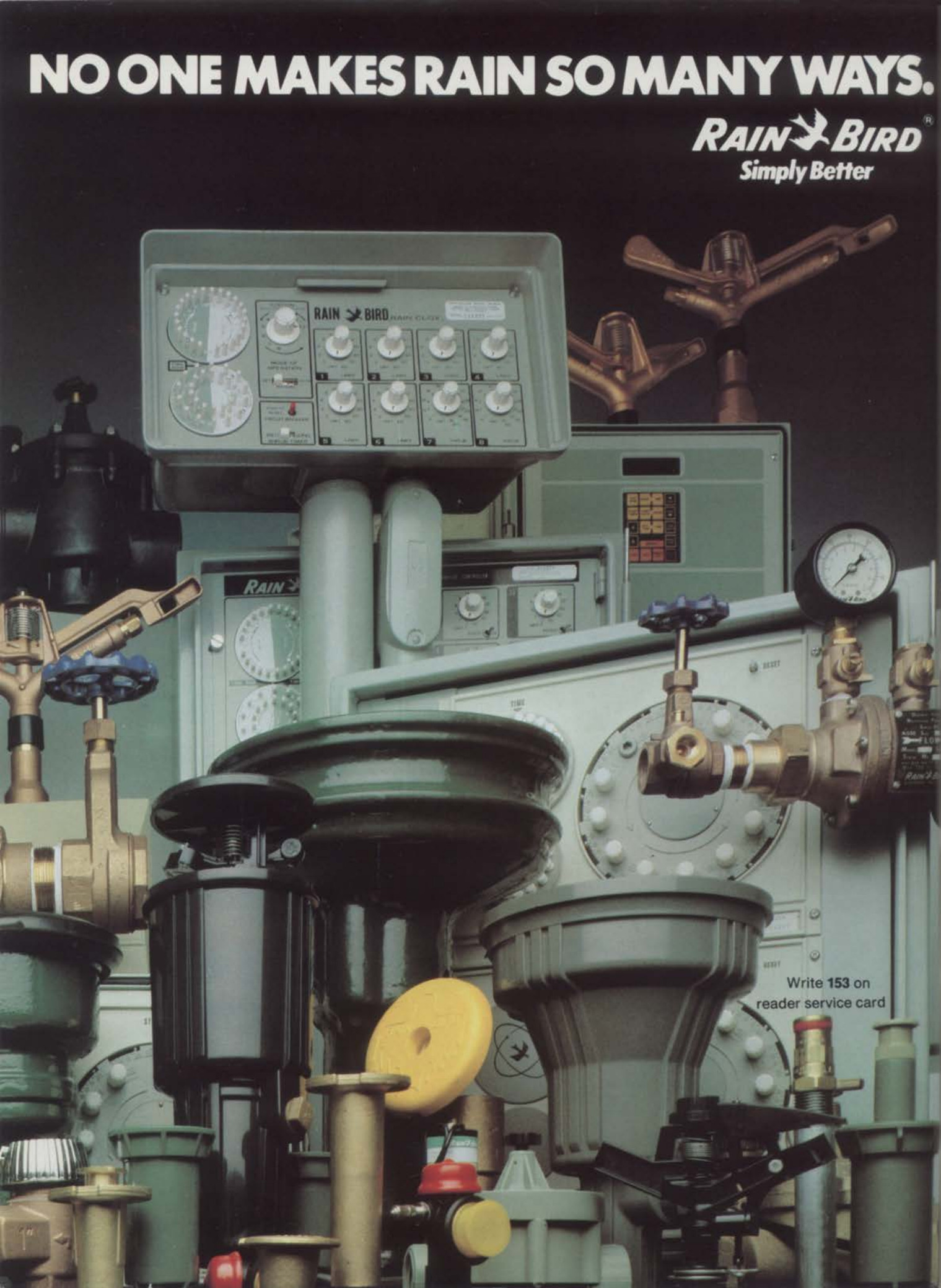

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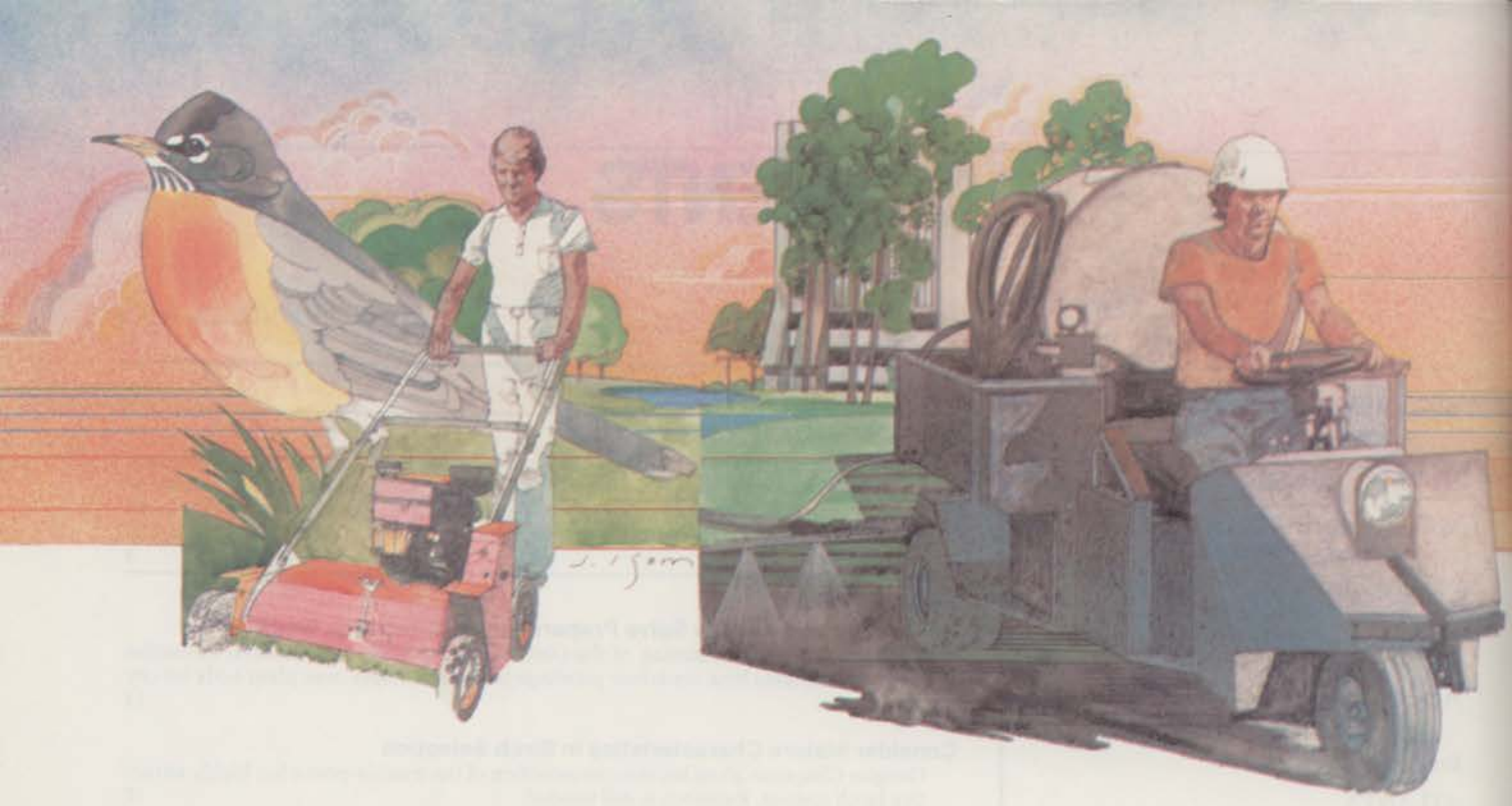
Member; American Business Press, Business Publications Audit, National Golf Foundation, American Sod Producers Association, Associated Landscape Contractors of America, National Landscape Association, Horticultural Research Institute.



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OUTLOOK

By Bruce F. Shank, Editor

One of the last reports to reach the Environmental Protection Agency during the Carter Administration was one by the Urban Pest Management Committee of the National Academy of Sciences recommending development and promulgation of new regulations for urban pest control. The prospect of such laws, although they would provide grants for pest control research, is too risky.

Regulations specifically for urban pest management, on top of existing laws, might backfire as other laws based upon good intentions have. I know a number of the members of the committee and know how sincere they are and how valuable they have been to the field of structural pest control in urban areas. We met while I was editor of *Pest Control* Magazine, the parent publication of *Weeds Trees & Turf*.

Rodent and cockroach control in urban areas are ongoing battles with no permanent solution. This battle is a losing one in depressed areas of our cities where control is not economically feasible without government support. In these areas, officials try to prioritize public health threats and use limited funds and manpower to protect the poor. It is a situation closely aligned to soothing the national racial conscience by massive use of buses, realizing that the buses will not solve the problem of inequality. The child still goes home to less than the children he meets at school.

Research support for public health pest control is absolutely critical. Shrinking tax bases in northern cities are threatening public health funding. The dollars to support these pesticide uses during EPA scrutiny are considerably less than those of agriculture.

Urban pest management needs special attention and support, but through existing agencies. After all, the EPA was established to solve implementation problems of previous regulations under the Department of Interior and the Department of Agriculture.

Another danger is lumping public health pest control with commercial pest control in urban areas. Don't we now have the compliance of contract applicators? The Environmental Defense Fund and Friends of the Earth have posed serious objections to the spraying of trees even under the control of licensed applicators. Are they saying the law is not working?

Indeed, we need to know more about the use of pesticides and their effects in urban areas. This is a responsibility of EPA as it now stands and another layer of regulations will only make doing the job right more difficult. If you can't accomplish basic tasks due to confusion and mismanagement, certainly adding another layer of regulations to interpret will only add to the problem.

President Reagan appears to understand this. He claims to be able to separate conscience from logic. We hope he succeeds in this case. **WTT**

WT&T

LETTERS

Improper pruning cut

Your cover picture on the November issue is a perfect example of an improper pruning cut. Indeed this is not the fault of the workers, because we have been told for ages that a proper cut is a very close flush cut. We now know from current research that the branch collar should not be injured or removed. We are trying now to get this message out to as many people as fast as possible.

I always enjoy reading Weeds Trees and Turf.

Alex L. Shigo
Chief Scientist
U.S. Dept. of Agriculture,
Forest Service
Northeastern Forest
Experiment Station
Durham, NH

Educating public on DED

I have read with great interest your November 1980 Weeds Trees & Turf article on Dutch Elm Disease.

Our Village has an ongoing Dutch Elm Disease Control Program and this article does a tremendous job of explaining the disease and suggesting additional steps to take in our preventive program.

As your article states, educating the public is an important part of an effective program. Along these lines, I am interested in obtaining additional copies of this article or receiving written permission to reproduce this article as a hand-out for our residents who become involved in our Dutch Elm Disease Program.

Sincerely,
Carl F. Peter
Director of Public Works
Village of Glencoe, IL

Bentgrass not nimblewill

A slight delay but I will feel better for having contacted you. Page 64 of the October 1980 issue of WEEDS TREES & TURF contained information I must disagree with. The question was asked as to the best way to distinguish nimblewill from bentgrass. You had drawings depicting colonial and creeping bentgrass and nimblewill. It is my belief that the ligule shapes of the bentgrasses are reversed—colonial being short and truncate while creeping is fairly tall and somewhat acute. No argument with nimblewill!

C. Richard Skogley, Professor
Turf Research Specialist
Plant and Soil Science
University of Rhode Island
Kingston, RI

Finds February useful

The February 1981 issue of *Weeds Trees & Turf* is packed with timely and widely useful information. Every feature article is either directly useful or essential background material for people in landscaping, restoration, ecology, climate control, and utilization. What a hard act you have to follow! I'll be anxious to see the March issue.

Hearty thanks for your efforts!

I also appreciate your support of Horticulture Research Institute. Some of the *Weeds Trees & Turf* thrust is down the center line of our efforts.

W. R. Heard, Treasurer
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GREEN INDUSTRY NEWS

Landscape contractors focus on computers

Eight hundred landscape contractors and their spouses learned how to successfully utilize computers and properly manage their business in the complex economy of the 80's at the annual conference of the Associated Landscape Contractors of America.

Computers, management, election of new officers, and the presentation of environmental and safety awards dominated the week-long (Feb. 8-13) series of talks and presentations in New Orleans. A computer display presented by various manufacturers helped stress the importance of "Getting the Right Numbers," the theme of the meeting. Members of the industry challenged landscape contractors to sharpen their own business management procedures, find practical solutions to their problems, and develop the right numbers in their own operation.

Gunther Klaus, internationally known business economist and management consultant, revved up the meeting with his keynote address on "The New Management." After crediting landscapers with shaping the land and the future, he listed changes that would occur in the 80's and suggested landscapers develop a workable, salable strategy.

Gray Payne of Ross-Payne Associates echoed many of Klaus's comments and addressed them in a framework suitable for the landscape contractor. "You have to manage more aggressively and understand the cyclical aspects of the economy," he said. He described the inaccuracies in some bases of accounting and the foibles of estimating. He also talked about losing money through large material inventories and improper design/build and how typical money incentives don't work for landscape employees.

Talks on computers, an interiorscape workshop, an equipment demonstration, and specialty workshops were sandwiched between the management talks. Computers grabbed the stage for one full day and part of another. Hardware manufacturers and systems/software suppliers displayed products and services for the landscape contracting industry.

It was only five years ago that the first

Continues on page 13

Emphatic in style and message, Gunther Klaus, an international business consultant, urged landscape contractors to update their management and ways of addressing problems in a fluctuating economy.

Arborists confront IPM in Sarasota

Along with solid advice on how to manage and save costs in operating a business, arborists heard several talks about the potential of integrated pest management at the National Arborist Association's annual meeting in Sarasota, Florida, Feb. 15-19.

Chuck Cissel, chairman of the NAA pesticide committee, delivered a message to the arborists which may be prophetic for all members of the Green Industry. Since arborists' work is highly visible and spray bans are being proposed, good planning and cultural practices have become very important. Much of the IPM technology is in its infancy, Cissel said, but now is the time to begin marketing and educating customers.

"An IPM program should be no less profitable," Cissel said. It retains the same objectives arborists have followed for good tree care, but accomplishes them in a different manner. The association is planning several pilot projects and developing new educational materials toward this end.

Dr. Ian Weatherston of Albany International Corp. spoke about how to practice IPM with pheromone traps. Acknowledging that there are more than 90,000 species of insects in North America, Weatherston discussed his company's research in combatting some of them with pheromones. Basically, pheromones sprayed in a field confuse males so they can't find females and mate.

Dr. William Wallner from the USDA in Connecticut presented a thorough discussion on gypsy moth management, a problem in regions all over the world because of the insect's tremendous adaptability. Long-distance spread from campers and firewood has caused infestations beyond the Northeast into Oregon, Virginia, and throughout the Midwest. Prevention includes cleanup, biological control, and some chemicals, but this year's infestation may be the most devastating yet.

Other highlights included Larry Holkenborg's talk on his combination tree/lawn care business; Chuck Dauphinee's use of propane for fuel on his company's trucks; Barry Graham's discussion on the value of computer consultants; and Daniel Coffman's history and update on policies to avoid unions.

New officers for the association in

Continues on page 13

LANDSCAPE CONTRACTOR NEWS

Landscape clinic lays a path toward profit

The Landscape/Garden Center Management Clinic presented a new awareness of the 1981 meeting's theme, "Management — The Path to Profit," at its meeting held Feb. 1-4 at the Galt House Hotel in Louisville, KY.

Six hundred people, including 115 students, heard a variety of talks on new approaches to management for operators of landscape firms and garden centers. Daily educational sessions were complemented with buzz sessions each night. New officers were also elected for the two groups.

Many of the talks centered on personnel. Carl Jacobs of Shiloh Nursery spoke about "Selecting, Training, and Motivating a Landscape Staff;" Lew Van Buskirk discussed "Working the Fringes — Profiting Through Employee Benefits;" and a team of speakers focused on "Motivating Part-Time Employees to Full-Time Success."

"There is a lot more emphasis and interest on personnel now in management from a landscape/garden center point of view that one has to concern himself with," says Bob Fortna, director of publications for the American Association of Nurserymen. "As a result of this interest and modernization of landscape and garden centers, people are beginning to realize that update of personnel, cost control, and inventory techniques are very important."

Other topics at the clinic included "A Path to New Profits" by Joe Marsh, J&M Landscaping Maintenance Consulting, Inc.; "Sound Principles for Satisfying Profit — Analyzing and Applying Financial Information" by Dr. W.D. Downey of Purdue University; "Creative Thinking — Putting Creative Theory into Practical Application" by Terry Hinemean, Morris Massey Associates; and "Applying Operating Cost Statistics to Your Business" by a panel of experts.

The annual meeting is evolving even more into management, says Fortna. "In this industry, we have been neglecting business techniques. In this kind of economic climate, you have to be more precise and up-to-date."

New officers for the National Landscape Association elected at the meeting are: Gerald Harrell of Landscapers Unlimited, Houston, TX, president; and Joe Wayman of Forest Keeling Nursery, Elsberry, MO, vice president.

Elected to serve for the Garden Centers of America are: J.D. Causey of Causey's Garden Center, Wilmington, NC, president; Frank Akin of Akin's Nursery and Landscape Co., Shreveport, LA, vice president; and John Teas of Teas Nursery Co., Bellaire, TX, new director. John Horton of Horton Nursery Sales, Cleveland, OH, becomes the past president.

Contractors show good safety record

The landscape contracting industry has developed a remarkable record for safety over the last year, incurring only one time-lost injury for every 18,000 man-hours worked.

The incident rate for the industry was determined to be .056—defined as .056 injuries per 1,000 man-hours worked. This equates to one injury per 18,046 hours worked—one injury per 2,256 mean-days. The time-lost rate was determined to be .708 days lost (due to injury) per 1,000 man-hours—one day lost for 176 days worked.

This data comes from a survey of a representative sample of the industry that was conducted by the Associated Landscape Contractors of America in conjunction with the ALCA safety contest. The time span for the study ran from September 1, 1979, through August 31, 1980, with data reported monthly by contractors.

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ALCA *from page 8*

economic computers were built for small industry, said Paul Ritchey of Gustin Gardens, Inc. Now it is a booming industry which should change much in upcoming years. It no longer takes a special computer operator to handle basic functions—payroll, general ledger, accounts payable/accounts receivable, and mailing lists—and secondary problems, such as generating statements and tax forms, word-processing, and analyzing value of services and personnel.

Sally Kujawa of Kujawa Enterprises, Inc. told her success story with a computer system and what guidelines to follow when purchasing one. These include knowing the software vendor and who he buys from, picking the type of software program for your particular needs, and getting a written agreement if you buy software from a different vendor than the hardware seller.

In a session entitled, "Learning to Live with a Computer (Marriage, Not Divorce)," a panel of industry representatives and contractors discussed the problems with a computer once you are engaged with one. "There is a direct correlation between top management's involvement and the success of a computer installation," said Frank Ross of Ross-Payne Associates.

Dale Saville, manager of computer operations for the J.P. Stevens Co., listed troubles from computer installation, which if not handled, could and have forced companies out of business. Yet it is inevitable that computers are here to stay. "Automate?" Saville asked. "Yes. People not doing it will be left behind. In this decade, those not involved will be gone."

Specialty workshops that ran concurrently dealt with marketing design/build, people development in maintenance firms, land reclamation, and task force, which discussed how landscape contractors and landscape architects could work together. Jot Carpenter of Ohio State University conducted a separate workshop on how to read design plans and how to design your own plans clearly.

New ALCA officers for 1981 are: Allen Keesen (Allen Keesen Landscape, Inc.), president; Ray Gustin III (Gustin Gardens Inc.), president-elect; David Pinkus (North Haven Gardens) and J. Landon Reeve (Chapel Valley Landscape Co.), vice presidents; Rodney Bailey (Evergreen Services Corp.), treasurer; and Irvin Dickson (ChemLawn), secretary.

GOVERNMENT UPDATE

EPA advisors recommend pesticide study

The Committee on Urban Pest Management of the National Academy of Sciences has recommended to the Environmental Protection Agency that it undertake "a comprehensive nationwide study of pesticide use in urban areas," including use and exposure of pesticides to professional and private applicators, as well as the exposure and effects of pesticides on others.

The committee stressed the need for special attention and regulation of non-agricultural pesticide use. It suggested grants to urban governments for the management of pests tied to enforcement of laws for pest management as a condition of funding. The committee recommended establishment of guidelines followed by regulation.

If put into effect, the regulations could provide needed funding for pest management technology. However, such regulations would add a second layer to the current regulations intended to cover both agriculture and urban pest control. They would also require personnel to enforce and manage.

Members of the committee included national experts in urban rodent control, insect control, public health, medicine, and law. The Environmental Defense Fund was also represented.

Fire ant program restored with pesticide

The recent conditional registration by EPA of Amdro, a bait product, has regained USDA support for aerial fire ant programs. Support was stopped in 1977 due to problems with mirex.

Seven southern states have indicated interest in aerial programs. North Carolina and Mississippi will conduct ground application programs with Amdro.

The imported fire ant has been found in nine southeastern states. It looks like an ordinary red ant but is aggressive and has a vicious sting when disturbed by humans or livestock. They create large colonies dependent upon worker ants to collect food. When the workers pick up the pellets of Amdro combined with soybean oil and corn grits and take them back to the colonies control approaching 98 percent is achieved.

North Carolina State University entomologist Charles Apperson has been tracking the spread of the ant in North Carolina. He says Amdro brought back to the colony kills the queen ant only. He expects a delay of two to three years before full registration is obtained. North Carolina farmers have reported soybean crop losses caused by the ants.

More funds available for small businesses

The Small Business Administration has acquired an extra $200 million to lend through Local Development Companies for plants, buildings, and machinery. Terms are up to 25 years to pay and a $500,000 ceiling. Details are available from local SBA offices.

IPM *from page 8*

1981 are: Walter Money, Guardian Tree Experts, president; Eric Haupt, The Haupt Tree Co., president-elect; Lee Lesh, Lee's Tree Surgeons Inc., vice president; Robert Mullane, Alpine Tree Care Inc., secretary; and Neil Engledow, Midwest Tree Experts, treasurer.

The arborists also dedicated an historic tree, a huge banyan. It was growing at the Thomas Edison Home in Fort Myers.

COMPANY

Toro president leaves in major cutback

Toro, suffering from overcommitment to the snowblower market and two mild winters, released President Jack Cantu and three vice presidents. More than 125 salaried employees lost their

Continues on page 53

CONTAINER ORNAMENTALS SOLVE PREPARATION AND MAINTENANCE WOES

By Gary A. Anderson, Chairman, Horticultural Industries Technologies Division, Agricultural Technical Institute, The Ohio State University, Wooster, Ohio.

As a result of efforts to minimize maintenance, many areas around club houses and public buildings lack the sparkle and zip of colorful annual flower plantings. The groundskeeper may justifiably point to compacted and nutritionally deficient soil conditions, poor drainage, and simply a lack of open ground as reasons for not experimenting more with annuals. In addition to that, one can usually add lack of experience in working with flowers. Once one has seen the dramatic difference that colorful flowers can make in the grounds and has experienced the satisfaction of working with the plants, he will be eager to continue and increase his horticultural expertise in this area.

A method of growing annuals that can completely circumvent dealing with the afore-mentioned problems is to grow the plants in containers. This allows one to start with a soil mix of his choice and avoid the long-term or costly process of modifying existing soil for vigorous flower production. It also introduces an element of flexibility that allows plants to be moved to more favorable light conditions for better growth, to protected areas in times of severe weather, and to focal areas for accent at special occasions. Plants in containers enjoy good air circulation which cuts down on disease infestation. Crawling pests may never reach them at all.

Container selection should be guided by a few growing rules as well as aesthetic considerations. A large container, over 3 feet in diameter, is easier to keep moist than a smaller one which dries out frequently. Outdoor container plants dry out faster than plants in the ground. Unless there is abundant rain, they need water almost every other day in warm weather. In hot sunny locations with drying winds, daily watering may be required.

Containers should also have drainage holes so that the soil will not become water-logged during times of heavy rain. If the soil mix is light enough and the container has drainage holes, overwatering will never be a problem. On the contrary, during times of heavy rainfall, it is easy to neglect plants under eaves and awnings that are not benefiting from that moisture.

Containers should be compatible with their surroundings. Concrete, stone, and terra cotta have an earthy appearance and suit many environs. Wooden boxes and tubs have widespread appeal. Fancy urns of metal or stone are exquisite and add to the Victorian feeling or other historic period decor.

Selection of flowering plants for container growing involves an evaluation of the plant's specific growing requirements. These conditions are basically the same as for growing the plant in the ground. If a plant that requires considerable sunlight to bloom, like geranium, is planted in a redwood tub and rolled to the north side of a clubhouse under an awning where the light intensity is greatly reduced, it simply will not flower profusely. By the same token, a fushia lover who is determined to hang this plant from a porch on the southwest corner of a building, will probably be disappointed when the hot sun and wind cause it to wither and barely survive. The point is that we must select the right plant for the right place according to specific cultural requirements of the plant.

In the accompanying list are a number of plants that have reputations as good performers. Also there is a list of certain combinations of plants that combine well with each other because of their color, growth habit, texture, or degree of formality. Combination plantings are attractive and have the advantage of versatility. Plants that can perform best in the specific environment take over, while those that can't recede into the background. Since environmental conditions can vary considerably from location to location and are sometimes difficult to access accurately, this element of adaptability can result in great satisfaction to the groundskeeper.

Reliable Container Plants

For Sun	For Shade
Ageratum	Asparagus fern
Geranium	Begonias, tuberous and wax
Lobelia	Browallia
Marigolds	Caladium
Nasturtium	Coleus
Petunia	Impatiens
Sedum	Ivy
Sweet-alyssum	Lobelia
	Veriegated vinca
	Viola

Suggested Specimen and Combination Plantings

Single specimen

Geraniums
Petunia
Tree form lantana, fushia, geranium, roses

Single specimen baskets

Donkey tail sedum
Fushia
Hanging Tuberous begonia
Ivy geranium

Mixed urns

Caladium, pink wax begonia, variegated English ivy
Coleus, mixed impatiens, browallia
Fancy leaved geraniums, ageratum, variegated vinca vine

Mixed hanging baskets

Blue violas, white sweet alyssum
Nasturtium, French marigolds, blue lobelia, blue ageratum
Ivy geraniums, asparagus fern, blue browallia

In general, more upright plants are selected for ground planters while cascading plants are used for hanging baskets, window boxes, and balustrade planters. However, vines and other hanging plants soften the edge of any container and are good choices to use around the edge of upright plants in containers that sit on the ground. Ivy, vinca, and asparagus fern are especially useful for this purpose and will not distract from the flowering plants being featured. When an urn is

Continues on page 18

displayed on a pedestal it almost always needs some cascading plant material to enhance the display.

Containers of flowers can be planted in mid-spring and allowed to grow and fill out in a protected greenhouse environment before the danger of frost is over. If such space is not available, use plants grown in 4 or 6 inch pots for planting larger containers. Plants in small cell packs will take several weeks to fill out and are more susceptible to overwatering when they are first transplanted.

A main point to remember in planting a container is to not fill it too full of soil mix. Leaving from 2 to 6 inches as a reservoir at the top will allow water to soak down thoroughly and deeply rather than running down the outside of the container. A light soil mix of 1 part soil, 1 part peat, and part perlite will allow for good drainage. Complete watering keeps the root ball from drawing away from the container. If the soil becomes very dry, the root ball shrinks and water runs down the sides of the pot rather than in where the roots are.

Fertilizing on a regular schedule will insure continued development of the plants. A slow release fertilizer mixed in the soil at the time of planting will benefit the plant throughout the growing season. Water soluble fertilizers applied once every other week are easy to use and stimulate plant growth. Many container plants deteriorate about mid season because they are nutritionally starved.

Watch the plants and observe their needs. For example, in sunny windy times more water is needed than on cool cloudy days, plants in unglazed containers dry out faster than those in wooden boxes; large containers hold moisture longer than smaller ones and plants close together shade one another and help to prevent excessive moisture loss.

With container plants one doesn't have to wait a whole season to try new decorating schemes or improve the growing conditions. Baskets and tubs can be moved, if they aren't too large, to areas of greater or lesser light intensity or into an area protected from strong winds.

If you haven't tried container gardening, do so this year and enjoy the satisfaction it will bring to you and those who will appreciate your labors. **WTT**

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CONSIDER MATURE CHARACTERISTICS WHEN SELECTING BIRCH VARIETIES

By Douglas J. Chapman, Horticulturist, Dow Gardens, Midland, MI

Birch *(Betula)* is one of the most extensively used yet least understood trees found in the landscape today. One would guess that a clump white birch is incorporated into every landscape from the Northeast to the Midwest. Generally, birch prefer a high water table, well-drained soil, being found native near lakes, streams, and edges of swamps. The most widely used native birch include Sweet, River, Paper, and Gray Birch.

Sweet Birch *(Betula lenta)*, of all the natives, is the most underutilized. Ultimately, in the landscape, it reaches 40 to 50 feet in height with a 35-foot spread. When young, it has a pyramidal habit of growth which, at maturity, is an upright oval. The summer foliage is a bright green. Fall color is an outstanding yellow, in fact, it is most colorful during the fall. The bark is a reddish-brown (cherry-like), that becomes scaly brown plates at maturity with a wintergreen odor. The preferred soil is a deep, well-drained soil, but Sweet Birch thrives under a variety of soil conditions, including sandy ridge with high water table. The most significant insect problem is Birch Skeletonizer with Bronze Birch Borer and Birch Leaf Miner of little importance. Diseases are inconsequential. In the landscape, this specimen tree is outstanding in naturalized areas of parks or commercial landscapes. It develops the most outstanding fall color of all birch.

River Birch *(Betula nigra)* has a native range from Massachusetts to Florida and as far west as Minnesota. It is usually found in moist, well-drained soils, being short-lived (100 years), early in plant succession, indicating it is an intolerant species, e.g., requires 50 percent or more sun. Although it prefers moist soils, it tolerates a wide range of conditions from moist to extremely dry and gravelly. This medium-sized tree reaches 40 to 60 feet in height with a 40 to 50 foot spread. It is pyramidal when young, becoming oval to round at maturity. The bark, when young, is cinnamon in color, exfoliating in sheets but, as it matures, is dark brown with deep plates. The summer foliage is a dark green with fall color being nonexistent. Its leaves fall early and rarely develop effective color. If you are looking for a medium tree with light bark, River Birch is effective for only 20 to 25 years and then must be removed (it is not a substitute for White Birch *B. papyrifera)*. It is free of insect problems with anthracnose being the only significant disease. It grows rapidly and is a good specimen tree, multiple or single stem, for large-area landscapes, golf courses, or parks.

Paper Birch *(Betula papyrifera)* is a cold, Northern New England through Michigan tree. It will not tolerate a site or area where the mean daily temperature in July is above 70° Fahrenheit. Paper Birch is pyramidal when young, becoming an upright oval tree, 50 to 70 feet tall and 30 feet in width, at maturity, while holding lower branches clear to the ground. It must be pruned in August as it is a profuse bleeder in the spring. *B. papyrifera* should be pruned when branches are not more than two inches in caliper as it is a poor compartmentalizer and heartwood rot is a real problem if branches larger than that are pruned. It thrives in well-drained soils with a high water table (swamps or river banks). If White Birch is grown in droughty soils, it soon loses vigor and succumbs to Bronze Birch Borer, its most significant problem. The brownish bark, when young, becomes a chalky white after five to six years, exfoliating in large strips. It is a good companion tree with oak and pine. The summer foliage is a dull green with fall color being a bright yellow. One must be aware there is a tremendous individual variation in the development of fall color. White Birch is an outstanding specimen tree or can be used in mass plantings, parks, and commercial landscapes. Often it is grown as clump birch for residential landscapes, but, one must realize, it will probably die within 15 to 20 years. Further, every spring, it should be sprayed for Birch Leaf Miner and, after the first 10 to 12 years, sprayed for Bronze Birch Borer.

Gray Birch *(Betula populifolia)* is native to New England and New York. It has a narrow, upright habit, reaching only 20 to 40 feet in height, at maturity, with a 10 to 20 foot spread. In the wilds, it is normally multiple-stemmed and suckers profusely from the roots, producing a thicket. Gray Birch thrives in sandy, infertile soil, wet to dry. The bark becomes a good

Continues on page 18

Bark appearance can change with age in both color and texture.

Birches *from page 17*

chalky white but doesn't exfoliate. The wood is of little value but as a home landscape tree or small tree for golf courses or commercial landscapes, it is outstanding. It is often found associated with White Pine. It is susceptible to Birch Leaf Miner but is relatively resistant to Bronze Birch Borer. As with all native birch, it is damaged from salt spray (sodium chloride) or salt applied to the soil. Little pruning is needed or desired as, again, Gray Birch is a poor compartmentalizer and heartwood rot can be a problem.

European Birch *(Betula pendula)* looks like our native White Birch but is particularly susceptible to Birch Leaf Miner and Bronze Birch Borer. *B. pendula*, as reported by Kennedy and Nielsen, is so susceptible to these insect problems that it should not be planted in many Midwestern landscapes (Wisconsin, Ohio, Michigan, Illinois). When planted where it will survive, it will reach 40 to 50 feet in height with a 25 to 30 foot spread. The habit of growth is pyramidal, when young, becoming oval, at maturity, with pendulous branches. The tight white bark becomes marked, at maturity, with deep black fissures. Summer foliage is a glossy green with fall color being a poor dull yellow if it develops at all. It grows best in fertile soils. Pruning should be considered only during August as heartwood rot can easily be introduced when pruning. There are many cultivars of European Birch, but "Youngii" is the most outstanding and durable. Its one dominant characteristic, in addition to the pendulous habit, is no central leader.

Many Asian birches have been reported by Nielsen, Smith, and others to exhibit tolerance or resistance to Bronze Birch Borer. They include Monarch Birch, Japanese Birch, and "Szechuan" Birch. I am including them only in the hope that more will be tried throughout the Midwest.

Monarch Birch *(Betula maximowicziana)* reaches an ultimate height of 40 to 50 feet in the United States but in native Japan, it is often found over 100 feet in height. It has a round habit of growth with dense foliage. The leaves are dark green in summer with slight yellow fall color developing. It is rapid growing and displays good tolerance to urban conditions. The tight bark is a chalky white, similar to our native White Birch. Monarch Birch has been reported by Smith and Kozel as being resistant to Bronze Birch Borer. This tree is probably a hybrid, as it doesn't fit the classic taxonomic description. Nielsen, at OARDC, has recently reported true Monarch Birch species resistant to Bronze Birch Borer. Only time will tell if this resistance or tolerance holds up.

Japanese Birch *(Betula platyphylla japonica)* reaches 40 to 50 feet in height with a pyramidal habit of growth. The bark is a good clear white. The leaves are dark green in summer with little or no fall color. Dr. Ed Hasselkus, at University of Wisconsin, has reported this and "Szechuan" Birch as showing good resistance to Bronze Birch Borer. "In fact, when many other birches have died out, these two seem to continue."

"Szechuan" Japanese Birch *(Betula platyphylla japonica* "Szechuanica") is somewhat open when compared to Japanese Birch but maintains a good central leader. The leaves are a blue-green with fall color being nonexistent. Although this birch prefers moist soils, it seems to thrive when grown in turf and on dry sites.

When planting birch, one should remember they are relatively short-lived. Most *Betula* thrive in moist, well-drained, high-water table soils. Ranking from least susceptible to most susceptible to Bronze Birch Borer, they are Sweet, River, Gray, Paper, and European Birch. Pruning, when considered, should be done only in August. Birch is a profuse bleeder and poor compartmentalizer. Shigo has clearly shown that summer (August) is a good alternative and probably the prime time to prune trees which are known bleeders. Birch adapt well to our many conditions but due to Bronze Birch Borer, one should only use tolerant or resistant types. Further, nurserymen should inform the homeowner, *Betula* are relatively short-lived (25 to 30 years). Although there has been extensive work done on developing Bronze Birch Borer resistant trees by Nielsen and Smith at OSU, Cole Nursery in Circleville, Ohio, and Ed Hasselkus at the University of Wisconsin, only time will tell how these reported resistant trees will survive the landscape.

Birch can be a real asset in every landscape, but one should realize, first, they are relatively short-lived and require a high degree of maintenance. Further, Gray Birch is the smallest of all the birch, thriving on essentially sterile, sandy soils. Birch, in general, do not compete well with grass; therefore, planting with ground covers should be considered. And, lastly, high water table soils or frequent watering is needed if birch are to be kept healthy and free of Bronze Birch Borer. **WTT**

FINDING AND CULTIVATING PROSPECTS IN A SUBJECTIVE BUSINESS WORLD

New monthly feature to assist the landscape market with equipment purchase, rental, maintenance, and business management.

Dave Johnstone has more than 15 years experience in the construction equipment market. He has managed product introduction to the construction and rental equipment markets and has worked for a rental industry association. He has hands-on experience with nearly all types of outdoor equipment. If you have topics you would like Dave to address, you may write him at 267 Willow St., New Haven, CT 06511.

The same developments working for contract maintenance of public parks and recreation areas (see October, 1980 issue) are promoting contract maintenance of industrial and institutional grounds. Every year, it is becoming less economic to assign permanent employees and owned equipment to this task. While no one can argue that industrial real estate is booming, it has been far more active proportionately in the past year than residential real estate. Industries not forced to relocate or to modify their sites still are faced with the maintenance problem.

The great virtue of industries as customers is that they pay their bills—promptly, if you provide a cash discount for early payment or cash penalty for late payment to give the money managers some incentive to cooperate. In this time of expensive money, you really can't afford to carry anyone more than 30 days without getting compensation. Some have found that adding a finance charge (late payment penalty) at 60 days has improved collections by 35%, an astounding improvement. An occasional big-city bank, well-versed in the value of money, takes 120 days to pay its suppliers—an unconscionable schedule, which no small contractor can afford to tolerate.

There is a great inertia in multi-layered industry. Once you get onto an industrial organization's payment schedule as a regular contractor, you really have to goof up to be taken off.

Regardless of location, industrial business can be year-round, if you're willing to get into snow removal or broaden your activities to include other cosmetic work such as window-cleaning (there are arguments for and against such diversification; before committing yourself and your money, you must be certain that you really want to expand in the given direction and that you can do so profitably).

Empire-Builders Present Problem and Opportunity

Despite the advent of computers and the elevation of management to an academic "science," industrial decision-making is still largely subjective. An executive will make a decision because it strengthens his own position and not necessarily that of the company, although sales pitches always must be made in terms of benefits to the company.

In general, it is best to make contact with an industrial prospect on as high a level as possible, while acknowledging the prerogatives of lower-ranking decision-makers. This takes a good feel for politics.

Check with Purchasing First

The contractor in any event must clear with the purchasing agent or director of purchasing to be qualified as a supplier. Without this official stamp of approval, the prospective supplier won't get anywhere, regardless of other contacts.

It's the purchasing agent's job to determine that you can perform the work you wish to undertake. In most cases, he'll have his own set of questions, but it won't hurt you to have a capabilities brochure at the ready to leave with him, detailing your specific experience, your equipment, some of your other clients and customers (with their prior permission), and several financial references. You may not have to go as far as presenting profit & loss statements, but you will have to show you're stable and accepted by the community.

But Purchasing May Not Requisition Your Services

The decision to hire you as a contractor in place of payroll employees or your competition will probably not be initiated by purchasing, unless the company is small and the executive in charge of purchasing customarily handles building and grounds.

The requisition may come from plant engineering or from the plant superintendent's office or from the security department (where security is given a general responsibility for the exterior) or from a foreman or gang leader of some kind or from industrial relations or from community relations/public relations. Each manager interested in the plant's grounds may have a different axe to grind, and the axes do not all swing in the same direction. Certainly an equipment foreman charged with outside work is not going to reduce his own responsibilities and operating budget.

Investigation is Needed

There's really no shortcut to checking out an industrial prospect. If you know nothing about the company, perhaps you can get some good information on the decision-making people from the switchboard operators. This source has been recommended by plant engineers themselves, and it's been confirmed by this column. On one occasion, a switchboard operator stayed with the caller 15 minutes to track down a name and then called back long distance with a correction (there was a time deadline, whose importance the op-

Continues on page 20

CONWED HYDRO MULCH® 2000 FIBERS TEST-PROVEN EFFECTIVE IN PREVENTING EROSION

Conwed® Hydro Mulch 2000 fibers were **six times more effective** in controlling erosion than other fiber mulches in an impartial university test. That could mean six times more protection for your investment in seed, fertilizer, and labor, so you can minimize costly post-job repairs and redos.

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*Testing was done on a **2:1 slope.** After soil preparation, the plots were seeded and mulched in one operation and allowed to lay overnight. Simulated rain controlled at the rate of four inches per hour was applied until a targeted deterioration of the surface occurred. Product effectiveness was evaluated by "apparent" rate of erosion which was calculated by dividing the total time until deterioration by the weight of the material eroded.

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Prospects *from page 19*

erator recognized). Again the purchasing agent may be helpful if he likes your presentation.

While institutions resemble industries in many respects (and public utilities have many of the characteristics of both), the lines of decision-making power are by no means as muddled. There is usually a vice president or administrative assistant with specific responsibilities for buildings and grounds to whom you can go directly—after you've been okayed by purchasing.

Retired Salesmen Make Good Fact-Finders

You're faced with this paradox: you have to develop new business but you simply don't have the time to do any digging (beyond scheduled jobs!).

Some small companies are using retired salesmen to good advantage—particularly salesmen who have retired from an organization in the field. Often these seniors have extensive personal contacts and backgrounds. If they don't have the information, they can get it quickly. Most of them are anxious to keep their hands in. It's usually possible to get them on a part-time basis at a reasonable hourly wage. They really don't mind having to sit in an executive's office for awhile, because the busy-ness stimulates them.

With Industry, Capability Beats Price Appeal

It would be silly to say that price has no appeal to industry. Of course, industry wants a good price (even in those cases where it may have developed a big project budget for other reasons than economy). But industrialists say to a man that they are more interested in trouble-free service than in price. And it makes sense; they have enough to do without worrying about the plant or office building site every couple of weeks.

The people who make industrial decisions have a good grasp of costs (this is not always true of institutional decision-makers). They can often tell when you're quoting too low to get the job done.

Don't do it. Quote a price that will cover all your costs (including replacement of any owned equipment and adequate insurance coverages) and yield you a profit sufficient to keep you interested in doing your work. Chances are it will be easier to sell this price than one which makes no financial sense. Preparing bids and estimates is far too complex to cover at the end of a single column, but we'll try to chew into it next month. **WTT**

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John (Jack) Bogle, President of the R. H. Bogle Company, Alexandria, Virginia.

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M. L. Bugh, landscape architect, Indiana State Highway Commission, maintenance division.

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LANDSCAPE STRUCTURES ARE PART OF A COMPLETE MANAGEMENT PLAN

By Ruth E. Messinger, Contributing Editor

The domain of today's landscape manager extends beyond the planting and care of living material. A landscape includes structures designed to blend with the plant material and serve a practical or recreational function.

It consequently becomes advantageous for the landscape manager to gain skill in selection and care of certain landscape structures. This skill need not be limited to landscape architects. In fact, since the landscape manager must maintain the structures, his practical experience is a valuable contribution to their selection.

Split-log picnic tables, self-weathering bridges, stone aggregate planters, and rustic park shelters are popular architectural structures designed to blend with the natural environment. In contrast are structures which have a purely contemporary look—benches and planters of heavy-duty fiberglass and clean-lined site lights with tapered steel shafts. There is an abundance of products for every taste and landscape need. Write numbers from 301 to 331 on reader card for more information.

Benches

All-heart California redwood is the material used in Rosenwach's (301) Sitecraft benches and matching planters and litter receptacles. The backless Parker bench is set on wood pedestals and made of border members dressed 1¾" x 5½" and inner members nominal 2" x 4". A sculptured contour bench is set on a steel pedestal and comes in lengths to 84 inches. Planter benches are available also, in rectangular, square, and circular shapes. Standard rectangular and square benches are 18 inches wide and fastened by thru-bolted steel brackets.

Rosenwach's redwood round planter and circular planter-bench are available in custom sizes. The planter has two-inch-thick staves and galvanized steel hoops.

Algoma Net (302) has fashioned a line of benches for garden, terrace, paddock, or mall in southern yellow pine. The 42-inch garden bench is finished with an emerald-green, weather-resistant enamel paint and has a steel frame coated with satin-black enamel. The 60-inch mall bench, also suitable for playgrounds and patios, is equipped with well-spaced metal legs and finished in polyurethane.

Landscape Forms (303) offers the Trestle Group of benches and tables of red oak, redwood, and purpleheart with fiberglass and steel components. Inspired by European intricate wrought-iron benches, they have been translated into simple curves and rectangles

Survey Reveals Trends Among Landscape Architects

A survey of 100 randomly selected landscape architectural firms in the United States in February 1981 by Infometrics, a division of Harcourt Brace Jovanovich Publications, revealed the following trends:

- One out of three projects involve public facilities, schools, and parks. This makes public agencies the largest user of landscape architectural services. Consultation and commercial construction projects each represented an average of 20 percent of landscape architectural business. Single residential and multiple residence (condominiums, apartments, etc.) each represent 15 percent of business performed.
- The highest dollar value of specified materials was for site details and construction, such as retaining walls, steps, roads, ramps, bridges, signs, etc. Sport and recreational materials represented the second largest dollar amount of specified material. Plant materials were only the third in value specified. Two-and-one-half times more money is directed toward site details than plant materials.
- Landscape architects generally recommend only four out of ten area landscape contracting firms to perform their plans. They exclude the other six for reasons of quality and reliability. They say two out of three jobs inspected are done correctly.
- 90 percent make maintenance recommendations to go with their plan to protect their work as the material matures.
- Architects have noticed increased competitive bidding among contractors in the last six months.
- Supplier product brochures with specifications and industry publications are the primary sources used by landscape architects for updating.
- Two thirds of the jobs performed by landscape architects are billed, including materials and fees, at more than $20,000.
- Applicants for landscape architect positions are in adequate supply and reasonably skilled for the job. Nearly two thirds of the architects polled said they had no difficulty in finding good applicants.

A curved double bench trestle with back by Landscape Forms is constructed of 1 x 2 oak and welded steel.

for contemporary or traditional settings. A double bench with back measures 52"D x 96"W x 31"H and is constructed of 1 x 2 oak finished for outdoor use. This style also comes with a single back or without one. Matching trash receptacles and kiosks are available.

Also by Landscape Forms is the Shadowline 3.1, adaptable to any setting with a choice of bases and proportions. Made of solid 2 x 3 boards and matching spacers and framed by 2 x 6 face boards, it has steel splines and concealed rods for durability.

Victor Stanley (304) produces the Homestead Series of outdoor benches in backed and flat designs. A traditional park bench has seat and back members of 2 x 4 fir, redwood, or purpleheart slats stained in walnut. This company also offers a line of highly styled Unislat benches with slats that fit individually to the frames on special brackets. And a geometric bench, designed to encircle a tree, flower bed, fountain, or sculpture, is crafted of redwood, fir, purpleheart, or cypress in hexagonal or octagonal shapes.

For a really rustic flavor, there is BigToys's (305) People Bench, which seats up to five adults—or Vandy-Craft's (306) high-backed split-cedar-log swing seat (#33-C) with an overall width of 120 inches.

Planters

Fiberglass, the newest material for planters and planter benches, withstands heavy outdoor use. Landscape Forms's Mansard style planter bench (2.4A) measures 84" square x 34" high; wood seats are also available in red oak or redwood. The company's free-standing planters come in a variety of shapes, textures, and colors.

Apollo fiberglass planters by Valley View (332) are easily repaired, and their bottoms won't crack, freeze, or drop off. Their glazed exteriors give them a hearty appearance.

Two planters by Fesco (307) are made of Gem-Rock, a break-resistant material that helps soil retain its moisture and protects roots from sun. A round contemporary model is available in 12-, 14-, and 20-inch sizes. An ornamental 17-inch urn comes in a classic marble design. Both planters have a swirl-tone pattern to give them a natural appearance.

Park Shelters

Poligon Division of W. H. Porter (308) offers prefabricated park shelters in six basic structures—three hexagon buildings from 36 feet in diameter to 60 feet.

Continues on page 26

Project Area	Total Sample Dollar Volume	Average Sample Dollar Volume	Volume Share	Rank Position
Site details and landscape construction — like retaining walls, steps, roads, ramps, bridges, signs, etc. BASE = 76	$72,788,000	$957,737	43%	1
Sport and recreational facilities — like parks, playgrounds, fencing, indoor/outdoor furniture, etc. BASE = 73	44,930,000	615,479	27%	2
Plant design and composition BASE = 78	21,758,000	341,697	13%	3
Utility design — like water systems, fountains, irrigation ponds, pools, etc. BASE =63	16,316,000	258,984	10%	4
Outdoor electrical systems — like walkways, tennis courts, recreational areas, shopping centers, etc. BASE =64	11,855,000	185,234	7%	5
TOTAL VOLUME =	$167,647,000		100%	

Average value of plant materials specified in 1980 = $341,697
Average value of landscape structures specified in 1980 = $830,991

A hexagonal park shelter by W. H. Porter may be partially enclosed for rest rooms and storage.

two rectangular models (20-foot and 30-foot widths), and a 16-foot square building for use as a rest room or for shade on a golf course. The free-span design of the 16-foot model gives it an open, unobstructed interior. The popular Hex 36, when enclosed and insulated, will adapt to passive solar heat. A single Hex 36 has enough room for complete rest-room facilities with enough space remaining for concessions or storage.

All the buildings combine wood with a tubular steel space frame. Steel members bolt together for easy erection, and wood beams drop into purlin pockets attached to steel beams.

R. J. Thomas's (309) Pilot Rock park shelters have rustic wood-shake roofs and clearly defined steel understructures. They come in rectangular, hexagonal, and A-frame configurations. The open web truss design of the columns and roof beams creates an open-air effect.

From GameTime (310) comes a selection of linear shelters in five sizes which can be fully or partially enclosed with a panel system to form a concession stand or restaurant. The support columns are of vandal-resistant steel tubing, and the roofs have brown asphalt shingles. Doors, windows, and concession or display windows are optional.

Another GameTime structure is the prefabricated park and picnic pavilion of southern yellow pine. Its tongue-and-grooved roof is anchored by massive supporting columns and rugged cross members. Sizes range from 22′ x 27′ to 29′ x 116′, and all roof boards are precut to size and marked for installation.

Still another design is a pine golf course or rest shelter, which covers an eight-foot-square ground space.

Lighting

Lighting products come in a choice of styles to enhance either a traditional or contemporary architectural setting. There is a broad selection of cast ornamental lighting posts, such as Spring City Electrical Mfg. Co.'s (311) line of historical designs. Borough Hall has a cast-iron pole that stands 8½ feet to 10 feet plus the height of the luminaire. Other pole heights range up to 20 feet, and multiple luminaires per pole may be ordered.

Western Lighting Standards (312) presents Turn of the Century lights in a variety of fixtures and finishes. The Victorian, with its tapered and fluted pole shaft

Borough Post is an ornamental cast-iron lighting pole by Spring City in the style of the 1890's.

and cast-aluminum base, is reminiscent of the royal palaces of the early Roman Empire. Lighting fixtures come single or in clusters of five and can be pendant-mounted or post top.

The clean, flowing lines of contemporary lighting are embodied in Millerbernd's (313) Future Square Series, designed for a variety of installations, from shopping malls to parks and boulevards. The tapered shaft of each Futura model is square, and the mast arm is mounted at a 90-degree angle. There is a choice of tenon, single, or twin arms in four- or six-foot lengths, and slip-on mountings accommodate a variety of luminaires. Mounting heights up to 50 feet allow wide-area illumination.

Millerbernd discourages vandalism, a serious threat to outdoor lighting, by concealing the mounting bolts and nuts. And the high base of each model prevents bumps and scrapes from maintenance equipment.

Another collection of contemporary outdoor lights comes from Lightolier (314). There is a multi-faceted sphere with a beacon effect made of two hemispheres framed by cast aluminum which can be mounted on a pole or wall. A faceted octagonal site light has a framed enclosure of 25 facets of weathered brass. Its clear acrylic panels are shatter-resistant. An unusual approach to site lighting is the I Beam Cluster, made with two rows of single-piece globes, molded of impact-resistant polyethylene, which are fitted on both sides of an extruded aluminum beam.

Litter Receptacles

Litter receptacles are designed to meet large-capacity requirements of municipalities, parks, shopping malls, and plazas. Howard Products Division of United Receptacle (315) has both pole-hung, vandal-resistant metal receptacles and free-standing units. The R38 standard model is functional in shape and made of 18-gauge galvanized steel with a baked-enamel, high-gloss finish. It has four 5 x 21¾" openings and rounded corners for safety. A "Pitch In" symbol is silk-screened on two sides. The R38 also comes with wood or stone aggregate panels to blend with a natural environment.

Stone aggregate appears also in Clean City Square's (316) Model P30 litter container, which has a duronatic bronze finish. This receptacle is available in three sizes and five colors. A 30-gallon model measures 24" x 24" x 36" and weighs 147 pounds.

A heavy-duty refuse container of commercial-quality plastic by Rubbermaid (317) is designed for parks, where it is generally chained to a tree or fence. Another park model, from BigToys, is a rustic log container built to store a regular 50-gallon garbage can.

Bridges

Bridges are manufactured for pedestrian, bicycle, equestrian, golf course, and vehicle use. Continental Custom Bridge (318) produces custom-built bridges that span distances from 10 feet to 200 feet. They are available in painted carbon steel tubing or fabricated from the self-weathering Cor-Ten steel tubing, which deepens in color with the passage of time.

Valley View offers rustic cedar-wood bridges with handrails of northern white cedar. These bridges are made in three sizes and may be stained, painted, or left to weather to a natural silver-grey.

A rustic cedar wood bridge by Valley View of northern white cedar has rot-resistant handrails.

Fountains, Waterfalls, and Pools

Restfulness is a cool fountain, and Reno Studios (319) designs and manufactures various types that add beauty to a formal or natural setting. There are traditional cherub and goddess statuary fountains and a Piping Boy who sprays water from a reed instrument into a fluted basin. For a contemporary environment, a tropical fish spouts water into a petal shell. The sculptured figures, bases, and pedestals are assembled to order. Rebecca at the Well, No. 285, stands 52½ inches high and may be combined with a pump tier measuring 45 inches in diameter and set on a 17-inch base.

Hermitage Gardens (320) presents an assortment of rock/waterfall/pool fiberglass units designed by Russell Rielle. Each unit (assembled to order) comprises a rock coupled with a small basin of water which is set in a larger pool. Water is transported from the larger pool by a marine pump for dispersal at the top of the rock. Pool colors are brown or aqua.

Valley View has added a U-shaped free-form pool to its Starmist line. This pool is about 131" long x 86"

Valley View's garden pools come in 15 styles and sizes and four colors. This U-shaped free-form model is 131 inches long and holds 180 gallons.

Continues on page 28

wide x 8½" deep and has an 180-gallon capacity. Its smooth Gel-coat finish is weather-resistant. Patented top and bottom anchor fins eliminate frost-heave and imbalanced settling. Four colors are available: Raven Black, Sand Beige, Ultra Marine, and Earthtone Brown.

Fountains from Otterbine (321) enhance the natural beauty of ponds and lakes and improve water quality. By aerating and mixing the water, they help biodegrade organic wastes and reduce carbon dioxide and

This Otterbine fountain enhances the beauty of the lake and improves water quality.

other gases. Each one-, two-, three-, or five-horsepower model has an aluminum housing and floats in the water by means of a polyethylene flotation device. Electricity is supplied through a cable with an underwater connector that runs from the pond or lake to the power source, such as the pump house of a golf course. There is a choice of three spray patterns—standard, starburst (finer spray), and rocket (straight up).

Another kind of fountain is Western Drinking Fountain's (322) Model 35. This drinking fountain of 10-gauge rolled steel has a green or bronzetone scratch-resistant epoxy finish. For added protection, there is an access panel fitted with vandal-resistant screws. The fountain is operated by a push-button, self-closing valve with renewable cartridge.

Bleachers

Sturdisteel (323) makes a 10-row, 24-foot bleacher with elevated front walkway and aluminum seats and footboard. It may be ordered with wood seats and footboards, and in various lengths and row heights.

GameTime's galvanized steel angle-frame bleachers, also with aluminum seats and footrests, come in 8-foot or 15-foot sections, shipped knock-down. Each unit supports a load of 120 pounds per square foot. Frames are electrically welded into integral units and galvanized for rust-resistance.

Playgrounds

An abundance of modular wood playground systems have components that give every muscle a workout: climbers, crawlers, ladders, slides, parallel bars,

Playworld System's Tothouse combines a wood-and-steel ladder with a sheltered rest stop and slide.

whirls, buck-a-bouts and swings.

GameTime's Timb "R" Mod Play Systems can be customized for varying age groups. There are seven different base platforms, and more than 45 components are made to link platforms or connect to one platform only. These components are built of southern pine which is treated with a salt preservative. A spiral slide in brilliant yellow and rustic brown is available seven or ten feet high with a safety metal stairway and double handrails to provide maximum security. Other components are a suspension bridge, log-roll attachments, and swing links.

For an individualized playground unit that can be expanded as needed, GameTime offers the Mod "U" Log System of linkages and attachments. Many of its components are interchangeable with the Timb "R" Mod Play System.

An innovative concept by this manufacturer is the Atom Splitter swing. It features five swings encircling a suspended ball. The ground space is 30 feet in diameter, the overall height is 11 feet, and the weight, 188 pounds. Colorful climbers are available too, in a profusion of designs (Conestoga wagon, fire truck, railroad, etc.). They are made of galvanized pipe with no sharp angles or exposed bolts.

Action Products (324) offers play structures of 6" x 6" southern yellow pine timbers treated with Osmose K-33. Slides, trapezes, swings, and ladders are expandable to meet the physical requirements of any park or playground.

Two new construction climbers come from J. E. Burke (325)—the Burly Dumpster, a climber that looks like a dump truck (15'L x 6'4"H x 3"4'W), and "Front End Funster," a climber that resembles a front-end loader (10'5"L x 6'3"W x 6' 2"W).

Playworld Systems's (326) wood structures include the nine-foot Tire Swing Combo with chain-swung tire and a ladder and slide. The Tothouse (PW-280) is an imaginative unit that has a ladder leading up to a roof-covered platform, from which children slide down on the other side.

BigToys offers a unique chain network and log system called "Suspended Animation." The chains form

Continues on page 80

CHEVY'S BIG ON MEDIUMS

BIG ON DIESEL

It's a fact. More and more urban delivery truckers are going to diesel. Chevy responds by offering a choice of two rugged, mid-range diesel engines. They're designed for thousands of miles of service with minimal maintenance. Chevy Mighty Mediums with diesel power. A practical approach to the demands of the '80s and the demands of the industry.

DETROIT DIESEL

This high-powered Detroit Diesel "Fuel Pincher" 8.2 Liter (500 Cu. In.) V8 is available in two versions: turbocharged 193 net HP (205 gross HP) and naturally aspirated 153 net HP (165 gross HP).

CATERPILLAR 3208

Naturally aspirated. Offered in various power versions up to 199 net HP (210 gross HP). 10.4 Liter (636 Cu. In.) displacement. Some of the engines are not available in California. See your dealer for details. Kodiak cab option required.

BIG ON CHOICE

With all the different wheelbases, engines (both gas and diesel), transmissions, axles, springs, tires and available options, there are over 4,800 ways you can spec out one of Chevy's Mighty Mediums. There are 15 wheelbases to choose from and 25 available rear axles including single, dual-drive tandem and tag axles. See your Chevy dealer for details.

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Turf-Seed, Inc. developed **Columbia** bluegrass to be a quick rooting, rapid spreading bluegrass excellent for profitable sod production.

A good root system is important to get lawns through hot summer periods. **Columbia** has shown good resistance to Fusarium blight in California tests where Fusarium is a problem during dry summer periods.

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SPRING IRRIGATION PRECAUTIONS INSURE DESIGN PERFORMANCE

By Michael Morey, Irrigation Consultant, Dallas, Texas

With the onset of spring season fast approaching, it is time to start thinking about turning on the irrigation system. The following is a general guide, and in no case should this be construed as specific procedure.

For those of you who do not have a plan of your irrigation system, get one! The person or firm who designed the system should be able to provide you with a copy of the plan. If you do not know who designed the system, contact the contractor that installed the system and ask for the name of the designer or for a copy of the plan. The fee (if any) for this would be minimal ($5.00 to $10.00) and would be a worthwhile investment. An "As Built" plan, which should be provided to you once the installation of the system is completed, will show the location of Drain Valves, Manual Valves, Electric Valves, Sprinkler Heads, Piping, etc., along with dimensions from existing structures such as buildings, walks, curbing, etc.

Once you have a plan, study it and become familiar with the system in regard to location of the Water Supply, Drain Valves, Control Valves, Controller, etc. When you are familiar with the above, you will need to close the Manual Drain Valves (see Fig. 2-2), which

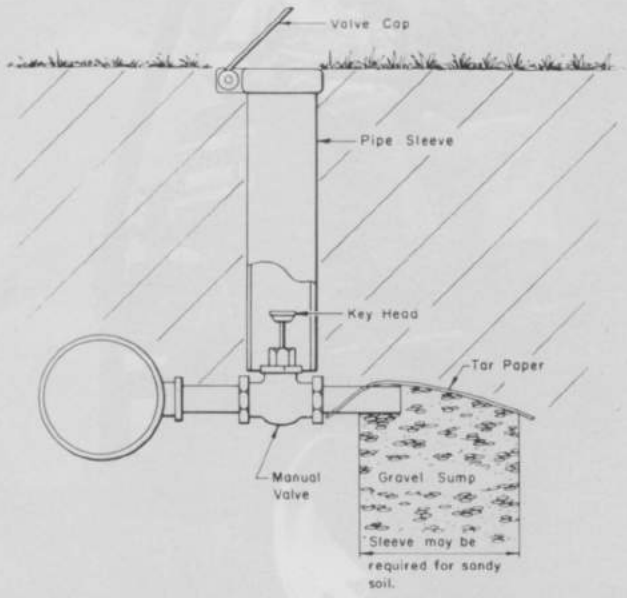

Figure 2-2 Typical Installation of Manual Drain

should have been left open during the winter. If your system is located in an area of the country where it is common to "winterize" by the use of a large air compressor, you may not have any Drain Valves located on the sprinkler main, although there may be some located near the Supply Valve and Control Valves. If you cannot locate any, do not worry; should any be left open they will be obvious when the water is turned on.

After all Drain Valves have been closed, make sure the Controller is off. Now turn the Supply Valve on only enough to allow a small flow of water into the Main Line. If you turn the valve on too fast, it will create a surge of water rushing into an empty main line and can easily cause a rupture in the sprinkler main.

This small flow of water may take quite some time to fill the sprinkler main, but this time used waiting for the line to fill is better spent than time used to repair or replace a ruptured Main Line. While the Main Line is being filled, walk the site and look for any Drain Valves which may have been left open, or for any leaks.

If you find any leaks, immediately turn off the Supply Valve and reopen the Drain Valves to drain the sprinkler main. Repair or replace the affected portion of the sprinkler main and then follow the above procedures to refill the main line.

After the sprinkler main is filled, inspect each drain valve, and using your valve key, open the drain partially to release any trapped air and also to flush any debris from the valve. Should any of the valve sleeves be filled with dirt, gravel, etc., now is a good time to dig them up and clean out the obstructions; if not done now, it will need to be done before the fall season. It is also a good time to install hinged valve caps with locking covers on those sleeves. This will prevent the cap from being lost or sucked into the power mower and also prevent anyone from opening them and dropping debris down the sleeve.

When you are sure that the sprinkler main is not leaking, go to the Controller and turn on the number one (1) controller station. Leave the Supply Valve only partially open and allow the piping in the number one (1) zone to fill until you can see water discharging from the sprinkler heads. Follow the same procedure for the remaining controller stations; do not open the Supply Valve fully until all zone piping has been filled.

If you detect any leaks, repair them and check the repair before backfilling the area. If any zone in which you find a leak supplies water to "gear-drive" sprinkler heads, remove the heads and flush the lines to remove any sand or debris. This sand or debris may have backwashed into the zone piping due to the leak. If this is not done, the sand and/or debris could damage the internal assemblies of the heads.

Once all the zone piping is filled and you have opened the Supply Valve fully, check all zones for proper operation. It is best to flush lines with the Supply Valve fully open. This will provide adequate pressure and flow to completely remove debris before reinstalling any gear-driven heads which you may have removed.

When checking the heads for proper operation, turn a zone on and make a visual inspection:

1. Are all heads discharging approximately the same amount of water?
2. Is the arc of coverage proper? (check plan)
3. Do any nozzles seem to be plugged?
4. Are any heads leaking or broken?
5. Are all heads operating as per plan?

Continues on page 33

"Piggyback" loaded for transport

Large capacity, hydraulic scoop

Hydraulic hole digger

A Powerful ... Safe ... Versatile Material Handler!

The "Piggyback" will lift a load up to 4500 lbs. at a time with complete stability ... turn quickly in its own length ... navigate curbs, logs, and other obstacles with ease ... trudge through gravel, sand and mud, but float over normal soil ... and then load itself onto your truck for a piggyback ride home at the end of the day.

Completely stable and safe! Safe fully loaded, even on rough terrain.

Heavy-duty, high torque wheel motors allow the "Piggyback" to operate on steep grades or in adverse ground conditions, and to drive over normal loading area obstructions with ease. It powerful, but economical diesel engine provides superior power for all adverse operating conditions.

Added Flexibility with Quick-Mount Options!

Optional hydraulic or mechanical scoop has a 15 cu. ft. bucket capacity and is built to last, from hardened, abrasive-resistant steel.

The hydraulic controlled scoop is apron mounted and is recommended for more difficult or prolonged jobs. Special quick-mount, hydraulic adapters allow complete attachment in under 10 minutes.

The mechanically operated scoop can be apron or fork mounted. Fork mounting can be accomplished in a matter of seconds.

Scoop attachments are great for quick handling of powders, scrap, sand, loose soil, chemicals, or other bulk materials.

Since the forks of the "Piggyback" will push with the same force as they lift, Princeton has been able to design an extremely effective fork-mounted hydraulic hole digger attachment to provide a valuable secondary function.

Mounting is fast and easy! Simply drive the forks into the mounts of the hydraulic power head ... secure mounting screws ... plug hydraulic lines into the special, quick-mount adapters ... select the appropriate bit ... and be ready to drill holes from 6 inches to 36 inches in diameter. The entire mounting procedure takes only a couple of minutes. The uses are endless!

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The "Piggyback" Does Almost Everything... Except Need a Trailer!

For further information or demonstrations, write or call collect for the dealer in your area.

Princeton's remarkable "Piggyback" may not do absolutely everything, but it is one of the strongest, most versatile material handlers of its type. The "Piggyback" gets its name from the way it rides suspended behind your truck to and from the job, never needing a trailer or taking up valuable load space. The perfect low cost, heavy-duty material handler for your industrial or agricultural needs.

Easily attached power equipment options provide the "Piggyback" with even greater job flexibility. Now, you can do several related tasks quickly and inexpensively with just one machine.

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If any nozzle seems to be plugged, remove the nozzle and turn the zone on momentarily to flush any debris from the head. Reinstall the nozzle and turn the zone on again to check for proper operation. If there still seems to be a blockage, remove the complete sprinkler head and check for an obstruction in the inlet of the head or in the fitting(s) under the head.

Check the wiper seals on the sprinkler heads (see Fig. 2-3); if they are leaking, replace them. A worn

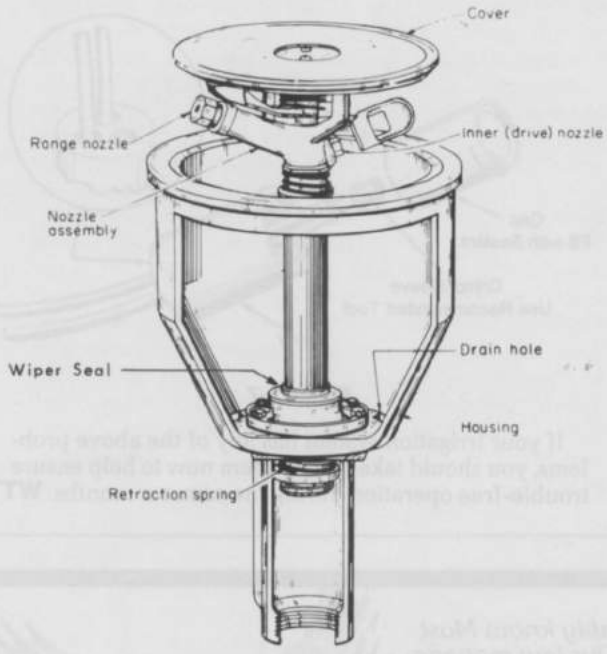


Figure 2-3

wiper seal in only one sprinkler head can waste approximately one thousand (1,000) gallons of water per year.

When turning off zones by the use of the controller, take note of the length of time it takes for the valve to shutoff. This time should be from 2-7 seconds, with the normal being 4-5 seconds. If a valve requires 10 seconds or more to close, the orifice(s) in the valve diaphragm and/or the exhaust fitting may be nearly plugged (see Fig. 2-4). If so, locate the valve and turn off the sprinkler main (Supply Valve) and open the

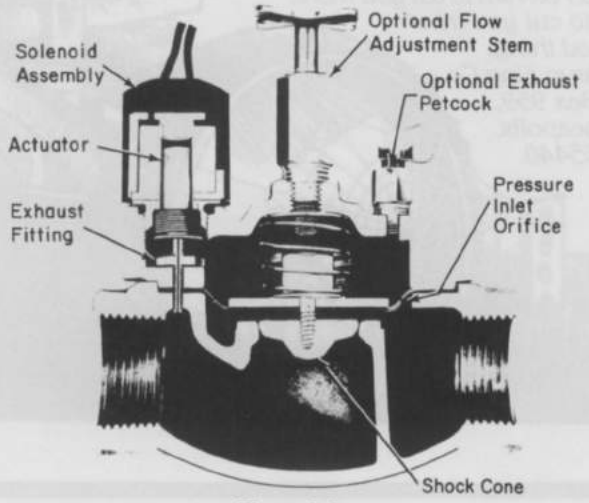


Figure 2-4

Drain Valve. NEVER ATTEMPT TO SERVICE A CONTROL VALVE WITHOUT FIRST MAKING SURE THE SPRINKLER MAIN IS OFF AND PRESSURE HAS BEEN RELEASED. Remove the cover bolts from the valve and lift the cover off. Make sure you keep parts in respective order for reinstalling. Check the diaphragm for cracks, replace if worn or cracked, and cleanse in a pail of clean water along with other parts. Remove the solenoid assembly from the valve cover and clean the actuator and spring. Clean the cover and cover bolts last. Reassemble all parts and bolt the cover back on to the valve body. Beware if you have any leftover parts!

After repairing the valve, close the drain valve and turn the Supply Valve on slowly. Operate the zone and recheck the valve-closing speed. Should the valve continue to close slowly, consult the distributor or manufacturer of the valve.

The Control Valves should be installed in valve boxes which are large enough to permit service without earth excavation (see Fig. 2-5). Should you need to excavate the earth to repair a valve, it would be advisable to obtain a valve box of proper size and use it for

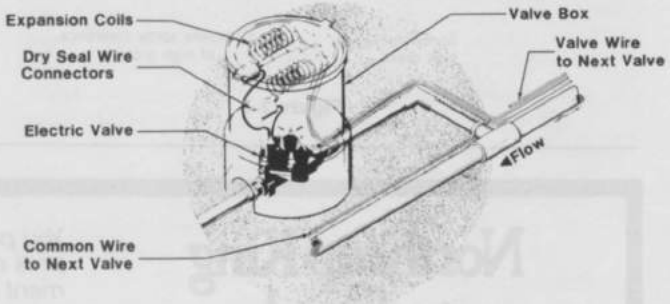


Figure 2-5

accessability for any future service. It will also serve as a good visual location of the valve.

If your system incorporates a booster pump, you should disconnect the power to the pump and follow the same procedures for turning on the system and filling the lines. Once the sprinkler main and zone piping is filled, reconnect the power to the pump and check the system for proper operation. This applies only to systems in which the water is supplied by the city main and the booster pump is used to increase the existing pressure.

If your system is supplied water by the use of a pump, follow the same procedures, although you should open the valve on the discharge side of the pump only about ¼ to ½ open and turn on a controller station when filling the lines. Once all piping is filled, open the valve fully and check system for proper operation. CAUTION: make sure the pump is fully primed before attempting to operate; failure to do so can cause pump damage.

Many irrigation systems require service when turned on in the spring. Even the best system available will require some type of service in its years of operation. With the cost of electricity, water, material, and labor increasing every year, this is the best time to get your irrigation system into proper operating condition. You may spend some money now in doing so, but if you wait, it will only cost more.

Continues on page 34

Irrigation *from page 33*

The most common causes of improper system operation are as follows:

1. Sprinkler heads not installed at the proper level (see Fig. 2-6)
2. Worn or broken sprinkler heads

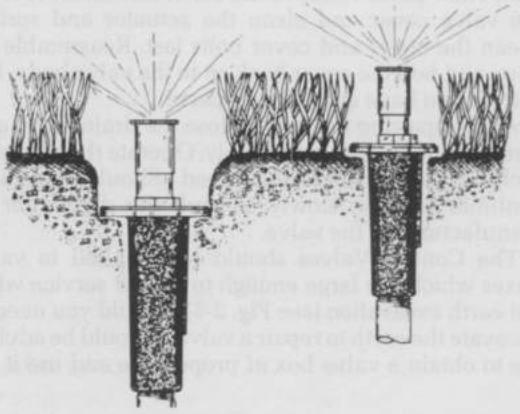


Figure 2–6

3. Improperly installed equipment (valves, heads, controller, pipe, etc.)
4. Valves which are in need of repair or replacement
5. Bad wire connections (see Fig. 2-7 for proper connection)

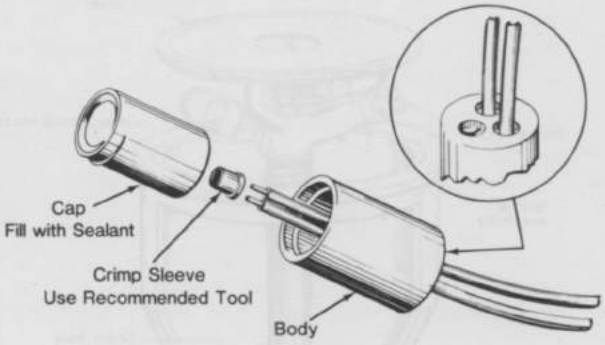
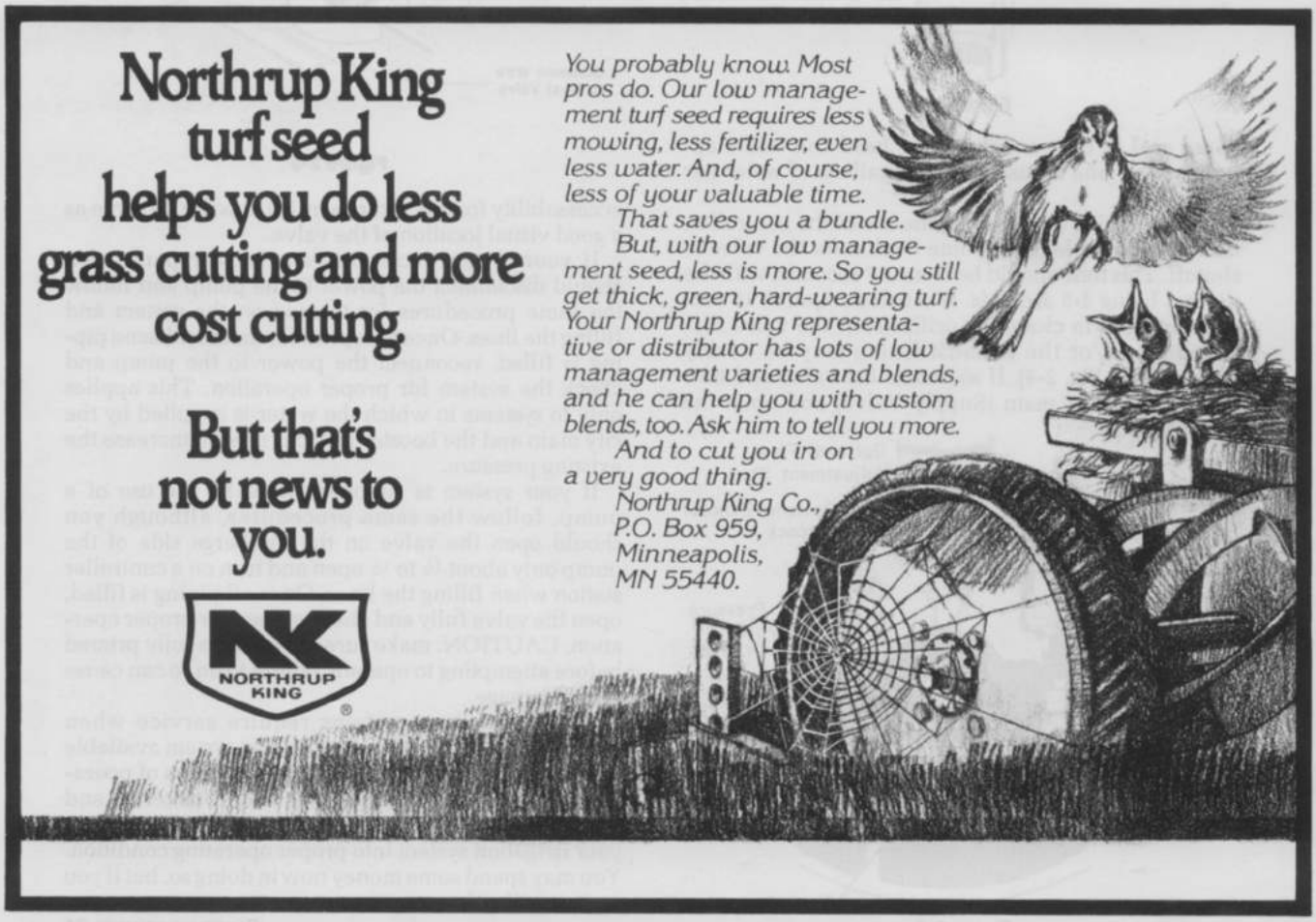


Figure 2–7

If your irrigation system has any of the above problems, you should take care of them now to help ensure trouble-free operation during the summer months. **WTT**



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REAGAN'S EPA: BALANCING RULES WITH THE BUDGET

By James G. Dickinson, special correspondent, Washington, D.C.

"Balance" has become a favorite word in Washington regulatory circles as the Reagan Administration seeks to change many of the things done or started by the Carter Administration. It's a good word to use, for although it can mean different things to people of different political viewpoints, in the current atmosphere of economic crisis there has been a remarkable fusion of differences to the point where "balance" is seen, generally speaking, in the same light by both Republicans and Democrats.

The people with the longest Washington memories scratch their thinning gray hair these days to remember a time when a President had the benefit of such consensus within the regulatory establishment. Was it Eisenhower, or does it go all the way back to FDR? That itch under everybody's saddle, the Washington bureaucrat, has undergone an astonishing change of demeanor since November 4. Unlike the cynical stereotype of past Administration changes, the average bureaucrat today is not thirsting to teach all these newcomers how Washington works — he's as anxious as the rest of the country to bring about "balance."

The Environmental Protection Agency, regulator of herbicides, pesticides, and fungicides among a bewildering array of toxic and other environmentally sensitive substances and processes, had not even fully completed its first decade of existence when the people expressed their will on November 4. Thus, there are no graybeards at EPA who remember how things were in the agency in Eisenhower's or FDR's time. But many worked in other agencies, and they're girding for what they expect will be an exciting, challenging, and simultaneously frustrating time as regulatory "balance" is swung into position.

The first instrument of this historic process came on February 17, just before Denver conservative Republican Anne M. Gorsuch was nominated to head EPA. On that day, President Reagan signed Executive Order 12291, an extraordinarily detailed and sweeping edict that stopped virtually every substantive pending and proposed regulation dead in its tracks, except those required by national security or court order. Included were some 38 final EPA rules that had either just come into effect or were about to soon become enforceable.

Among those were two dealing with the use of pesticides. Both were permissive rules sought by industry, and are not considered likely to be killed as a result of the review rigors to which they will be subjected under Executive Order 12291. More about them later.

The executive order, immediately remarkable for the high degree of bureaucratic approval it informally received as soon as it was issued, establishes a 25-step "regulatory impact analysis and review" procedure for all affected regulations. This procedure is so intensive that most informed observers agree that its first effect will be to significantly delay the practical onset of any of the affected regulations, and that its second will be to make the going so tough for many rules that agencies will simply just scrap them.

The President's stated rationale for the executive order is "to reduce the burdens of existing and future regulations, increase agency accountability for regulatory actions, provide for presidential oversight of the regulatory process, minimize duplication and conflict of regulations, and insure well-reasoned regulations." Wonderfully, the bureaucrats and rulewriters who have been responsible all along for those very ills are today among the heartiest applauders of that rationale.

Of course, bureaucrats are like regular people in that they have political beliefs too. Some are Republicans of anti-regulatory bent, and some are Democrats with opposite views. Many don't fit either stereotype. But it's both strange and reassuring to hear so many voluntarily declare, as one top regulation-writer of 20 years' standing declared to me, in speaking of Executive Order 12291: "I think it's wonderful, fantastic. We've got to turn the country around, or else we'll all go down the tubes without the Russians firing a single shot."

That bureaucrat, and literally thousands upon thousands of others like him, is already suffering all of the following fallouts from Executive Order 12291: Diminished job satisfaction, heavier workload, more frustration, less office help due to the hiring freeze, and harder personal finances resulting from the spending freeze that curbs pay hikes. Yet, strangely, many — if not most — of these bureaucrats are enjoying themselves more, in a perverse kind of way, than they did when it was they who called the shots; they see themselves as saving the country, and that's a heady feeling.

Look at some of the things Executive Order 12291 requires of each regulation, proposed, pending or final:

- Its potential benefits to society must outweigh its potential costs;
- Its objectives will be so chosen as to maximize net benefits to society;
- Among the alternatives to the rule's objective, that involving the least net cost to society *shall be chosen;*
- The rule's place in an agency's schedule of regulatory priorities must take into account the condition of particular industries affected, the condition of the national economy and other regulatory actions contemplated for the future;
- A special "regulatory impact analysis" must be prepared for and this must be sent to the Office of Management and Budget at least 60 days before it is to be officially proposed, to provide OMB with a chance to advise whether or not it wishes to comment — if it does wish to comment, the rule must be withheld until the comment is received.

These and many other delay-inducing requirements are also required of all "major" rules already in effect. Such rules are defined as those which are likely to result in:

(1) An annual effect on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers,

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Reagan *from page 35*

individual industries, federal, state, or local government agencies, or geographic regions; or
(3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The immediate reaction to the executive order, both within government agencies and without, was that it affected virtually everything in the pipeline, and possibly most out of it as well. Certainly, arguments could — and likely would — be made to review everything. The *Federal Register*, that hefty daily tome that publishes all regulations and associated notices, would have to go on a crash diet, cutting down on its average 250-pages-a-day consumption of newsprint. All it would likely publish from now on would be inconsequential procedural notices mandated by law, rules required as a result of explicit court orders — and a succession of notices staying the implementation of already-final rules, extending deadlines for comments on proposed rules, and proposing withdrawal of prior proposals.

When this was written, it was not immediately clear what would be the fate of two relatively noncontentious EPA final rules published in the dying weeks of the Carter Administration. These announced (1) That EPA would, from now on, establish pesticide residue tolerances, when requested, for replacement or rotational crops — rather than establish proscriptions on agricultural practices to insure that products bore zero pesticide residues; and (2) That state government could register, subject to EPA veto, certain pesticide uses and products not specifically included in EPA labeling, to meet special local needs.

The former, being more a statement of policy than the "final rule" it was termed by EPA, is so in harmony with Republican philosophy that Executive Order 12291's impact on it is almost certain to be short-lived. The latter, while still being generally in harmony with Republican thinking — encouraging a degree of state and local autonomy — will likely have to go through all the paces stipulated by the executive order.

One reason for looking carefully at this state registration regulation is the universal reluctance of industry to develop separate labels for each state or local jurisdiction. The rule could, conceivably, result in a plethora of special local and state uses and new products, each with slightly different labeling.

When the rule was proposed in August, 1979, this provision apparently failed to provoke great anxiety. For example, only one firm took EPA to task over it, a solitude that the agency took advantage of in rejecting the objection. "This commenter," EPA said pointedly, "apparently stands alone, even though other members of the pesticide manufacturing industry might benefit economically if the commenter's suggestion were adopted by EPA."

Potential economic benefit, of course, is what Executive Order 12291 is most interested in. EPA will doubtless be thinking long and hard about this before it so lightly dismisses such objections in the future, be they from a lone commenter or not.

Many matters, small and large, are changing in such manner at EPA. President Reagan's choice for Administrator will see to that, starting with her selection of some 24 deputy assistant administrators. She may — and doubtless will — retain many of the incumbents, since industry has not been clamoring for a wholesale cleanout; in addition, most are "career" people rather than political appointees, and as such can only be moved sideways, not fired.

Gorsuch's track record in her home state of Colorado, where she had been both a corporate attorney for Mountain Bell Telephone and an outstanding member of the state legislature, is one of strong decision making and dedication to state rights. Like the other Coloradoans who have been brought to Washington by Mr. Reagan, Gorsuch has critics in the environmental and friends-of-nature camps. News of her nomination was greeted by the Colorado Open Space Council with the observation that "She's hard-working and conscientious, but she's not particularly sympathetic to environmental concerns." In her first two years as a state legislator, the council rated her 33 and 8 respectively on its 100-point scale of environmental consciousness. By 1980, she had rehabilitated herself to 72 by sponsoring automobile inspection and maintenance legislation aimed at controlling Denver's air pollution.

Clean water and clean air will be her main concerns at FDA, she told me, ducking an opportunity to discuss more down-to-earth issues like pesticides, herbicides and fungicides. Had she no experience with such matters? "I didn't say that," Gorsuch replied stiffly.

If she hasn't had such experience, she will soon get it — in spades. The burning issue of the moment — if not the decade — in EPA's Toxic Substances Division is whether to ban outright all uses of 2,4,5-T and Silvex, contaminated by the teratogenic, abortifacient, carcinogenic "unavoidable" chemical Dioxin or TCDD. The contentious herbicide's fate is currently before an administrative law judge of the EPA, and whichever way his decision goes, Gorsuch will come under pressure to exercise her authority to overrule it. She may even come under immediate pressure to stop the judge's hearings — and she has the power to do that, too.

This pressure, whenever it comes, will inevitably call for a delicate value judgment from a woman who prides herself in having the capacity to make "hard decisions." Gorsuch is unlikely, observers say, to be unduly swayed by the teratogenic and abortifacient findings; as a woman who, activists allege, turned her back on the women's movement in Colorado, she may be expected to view the data unemotionally.

Which is to say, in the current parlance of Washington, she will apply "balance" to her deliberations. That should be good news to all but the most single-minded of EPA's many diverse publics.

Indeed, despite the inevitable political skirmishing that's going on over the Reagan budget cut proposals, most of what this new Administration is doing is meeting with general approval. As already stated, the most remarkable aspect of this general approval is the zeal with which harassed and otherwise frequently obstructive bureaucrats have rallied to the cause.

This is not the stuff of newspaper headlines, and television specials. Indeed, the news media — at least in Washington — can sometimes now be seen coyly admitting that it prefers to carp and to criticize, and that, yes, maybe it does overdo it now and again. **WTT**

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THATCH BIOLOGY: BALANCING GROWTH WITH DECOMPOSTION

By Richard W. Smiley, Ph.D., Associate Professor, Plant Pathology, Cornell University, Ithaca, NY

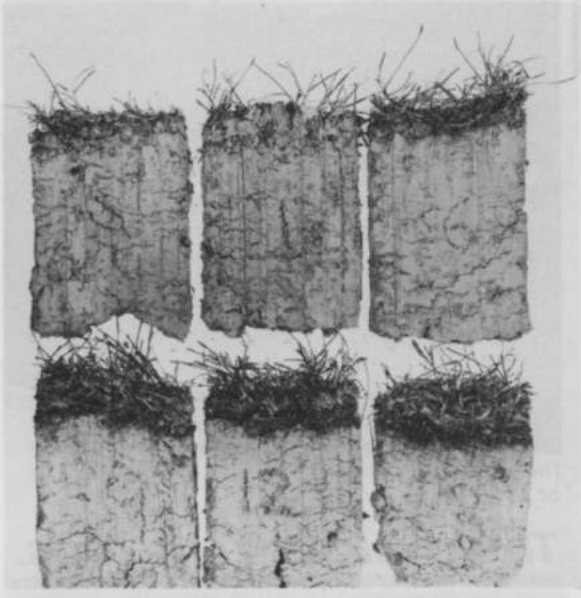
Thatch is an important property of turfgrasses. The causes of thatch are easily listed, but the manner in which these causal factors operate is not well known. This article will concentrate upon recent results of research on thatch accumulation.

Most definitions used to describe thatch agree that thatch is comprised of a layer of dead and living stems (tillers, stolons, and rhizomes) and roots that develop above the soil surface and below the leafy foliage. Leaf clippings are reported to contribute very little to the thatch layer. The leaf clippings generally form a pseudothatch, which is a less-densely packed layer above the thatch. A layer of intermixed soil, stems, and roots has been termed the mat.

Turfgrasses are not unique in possessing such layers; they are also found in grasslands, pastures, forests, and other ecosystems. In grasslands the layers are often designated at the A, Ao, and Aoo horizons, respectively, for the surface soil, mat, and thatch. Thatch is also synonomous with the terms surface litter, compressed litter or humid mulch. Pseudothatch is synonomous with loose litter or fresh mulch.

These comparisons set the stage for a discussion on the causes of thatch. It must be understood clearly that thatch is composed of organic litter, and that its management involves manipulations of biological process which do not differ from those occurring in other ecosystems.

Research conducted in other grasslands is therefore often directly applicable to our understanding of turfgrass thatch. Much of the following discussion is derived from studies of grassland ecology. The results seemingly explain many observed responses of turfgrass thatch to various environmental and management variables.



Fungicides can slow thatch decomposition in Kentucky bluegrass. Upper left sample was not treated with fungicide. Other samples show effect of five different fungicides on thatch accumulation.

Tissue Production vs. Decomposition

Plants produce tissues in cyclical patterns. Cool-season grasses, for instance, typically produce most leaf growth in the spring and autumn, and most root growth in the autumn and winter. The life of each leaf, tiller, rhizome, and root is relatively short, and a continuous cycle of tissue production and death occurs to perpetuate these perennial species. Decomposition of the tissues also depends upon seasonal cycles and the prevailing environmental conditions. Thatch results when the production of tissues proceeds at a rate more rapid than that for decomposition. This balance depends upon a multitude of interacting biological processes.

Factors Affecting the Balance

The tendency for thatch to accumulate or not depends mostly upon the plant growth rate, the composition of the plant tissues, the amounts and types of pesticides being used, and the fertility, aeration, temperature, and moisture *in* the thatch environment. Each of these factors can be expected to fluctuate widely and independently. The long-term overall balance is therefore more important than conditions at any specific time.

Plant Growth Rates

Plants which produce the most extensive root and stem systems are likely to become more thatched than those with limited amounts of these slow-to-decompose tissues. Varieties within a species can differ in both the composition and amount of these tissues. All of these variables can affect the tendency for thatch to accumulate. Likewise, all management procedures, including pesticides, which improve turfgrass growth will by definition increase the amount of tissue being produced. Some conditions will increase the rates of production and decomposition, but others will increase production and decrease decomposition. The most important of the factors are discussed below.

Plant Composition

An appreciation of thatch must include an understanding of the chemistry of plants. Numerous chemicals in plants occur in only small quantities, are easily decomposed by microorganisms, or both. These components contribute little to thatch. Constituents that are very resistant to decomposition processes and are also abundant in plants are the primary compounds found in thatch. Most of these compounds are necessary to provide strength to the grass plant, e.g., they give the plant its superstructure.

Waite and Gorrod (1959) analyzed the compounds of immature and mature ryegrass plants (Table 1). The most persistent components are ash, fats, waxes, phenolic compounds, lignin, hemicelluloses, and cellulose. Ash is the term designating the mineral elements (calcium, potassium, etc.) that are in the tissue. In this example the resistant components (excluding ash) comprised 42% of the young ryegrass plant, and 74% of the older plant. Beard (1976) provided a clearer per-

Continues on page 40

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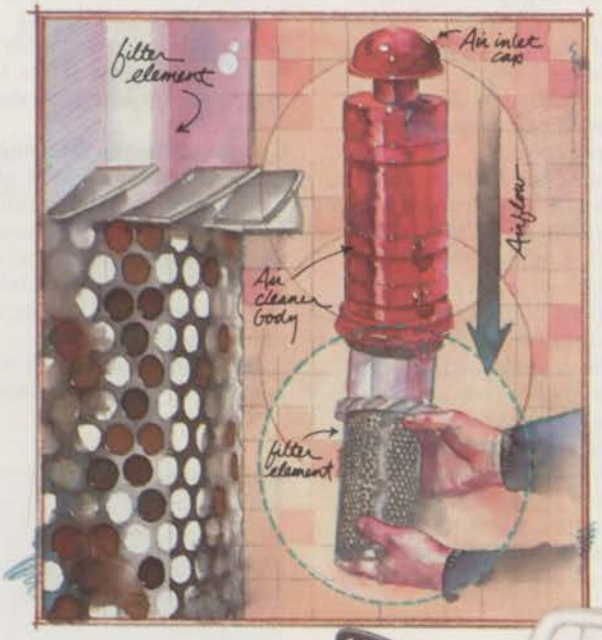

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Thatch *from page 38*

spective of the resistant components in several turfgrass species (Table 2). The table reports the composition of leaves, stems and roots of a bentgrass, a bluegrass, and a fescue. The bentgrass leaves had more hemicellulose than the bluegrass and fescue leaves, and the total of the three components was 11% higher in bentgrass leaves than in bluegrass leaves. In contrast, bentgrass stems contained about 15% less resistant materials than stems of bluegrass and fescue. Bluegrass stems had more hemicellulose than the other grasses, whereas fescue stems had twice as much lignin as the other grasses. No major differences in the compositions of root tissue were reported.

The compositional differences become important when the rates of decomposition of these compounds are compared. Clark and Paul (1970) and Whitehead et al. (1979) have each reported that, under ideal conditions, the time required for a 50% loss (e.g., the 1/2-life) of ryegrass leaf or root weight (excluding water) in soil was 20 weeks (Fig. 1A). At this rate, only about 80% of the original leaf weight will be mineralized (decomposed) to carbon dioxide, mineral elements, and other primary compounds during the first year. Decomposition rates differ for each of the resistant compounds. The half-life period is about two weeks for hemicellulose and cellulose, one year for lignin, 2.5 years for waxes, and 6.5 years for phenolic compounds (Clark and Paul, 1970). These rates are essentially the same in all plant litter (e.g., grass leaves or roots, oak leaves, etc.) in which they occur.

Table 1. Compositions of young and mature ryegrass foliage (from Waite and Gorrod, 1959).

Component	Percent of Dry Water	
	Young	Mature
Fats and Waxes	3.9	1.9
Organic Acids	3.6	2.0
Water Soluble Carbohydrates	29.5	4.6
Phenolic Compounds	0.4	1.1
Pectins	3.1	4.1
Crude Protein	7.5	3.4
Lignin	3.5	11.3
Hemicelluloses	14.0	25.7
Cellulose	20.2	33.8
Acetyl	0.9	2.0
Ash	7.5	4.9
Unidentified	3.3	3.0
Unaccounted for	3.0	2.3

Table 2. Partial compositions (%) of tissues in creeping bentgrass, Kentucky bluegrass, and red fescue (from Beard, 1976).

Plant Structure	Plant Species	Hemi-cellulose	Cellulose	Lignin	Cell Wall
Leaves	Bentgrass	34	19	4	56
	Bluegrass	26	18	2	46
	Fescue	27	21	3	51
Stems	Bentgrass	30	23	4	57
	Bluegrass	39	28	5	72
	Fescue	29	35	11	75
Roots	Bentgrass	36	27	14	76
	Bluegrass	34	27	10	71
	Fescue	34	33	13	80

Since most of the major constituents of plants decompose more rapidly than lignin, it is not surprising that lignin is a major component of thatch. It therefore becomes apparent that leaves should decompose much more rapidly than roots, that fescue stems should decompose as slowly as roots, and that stems of bentgrass should decompose almost as rapidly as leaves. The modifying effects of cellulose and hemicellulose presumably reduce the decomposition rate for bluegrass stems (including rhizomes) much more than for bentgrass stems (including stolons).

Causes of Tissue Decomposition

The decomposition of plant tissue is performed by the microorganisms, microfauna (small animals, including insects), and macrofauna (larger animals) in the soil. The numbers and types of organisms involved are very large, and their interactions are complex. Precise sequences of events apparently differ from one habitat to another.

Individual species of soil microorganisms do not possess all of the enzymes and other characteristics

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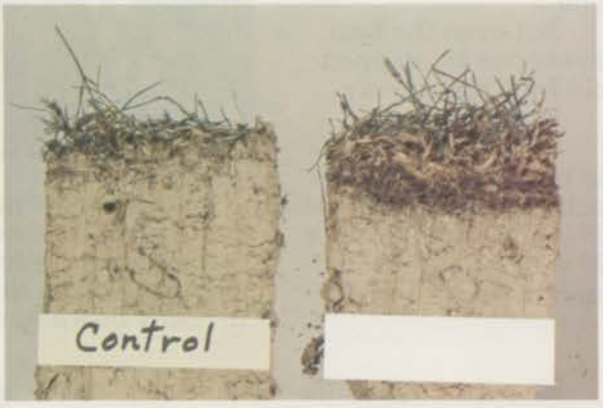

Three-year difference in thatch accumulation (top) in untreated and fungicide treated Kentucky bluegrass. **Two inches of thatch** in Kentucky bluegrass virtually separating turfgrass roots from the soil.

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necessary to decompose more than a few of the components in higher plants. Mukhopadhyay and Nandi (1979) have shown that *Fusarium* and *Penicillium* species decompose lignin much more readily than cellulose, whereas the reverse was true for *Helminthosporium* and *Curvularia*. Successions of microorganisms are necessary to totally decompose plant tissues; each group feeds on the residues remaining from a previous group's activities. Most soil animals, including earthworms, do not produce the enzymes needed to decompose plant tissues (Waid, 1974). The fauna assist decomposition by physically tearing tissue apart to allow microbes access to larger amounts of surface area.

Turfgrass specialists sometimes feel that decomposition of thatch is initiated by faunal activity and concluded by microbial activity. The fauna are thought to digest portions of the thatch and to relocate some of it deeper into the soil. This view appears to be supported only by popular belief and by visual observations of thatch accumulation where earthworms are absent (Lofty, 1974). But this viewpoint is contrary to the results of detailed soil ecology research. Tribe (1960) studied successions of organisms on cellulose in soil and found that fungi initiated the decay. Bacteria became involved later, and then nematodes began feeding on the bacteria and fungi. Later stages of decay involved larger fauna, including mites, collembolans, and enchytraeid worms. Clark and Paul (1970) and Waid (1974) concur with this general sequence for decomposition of grass roots. Curry (1969) used nylon bags of various small meshes to screen out variously sized groups of soil fauna from bentgrass and fescue leaves and stems that were buried or were left on the surface of a grassland. He concluded that the fauna contributed almost nothing to the rate of decay and disappearance of the foliar litter on the soil surface, and did not accelerate its decay in the soil. Malone and Reichle (1973) used chemical toxicants to eradicate different faunal groups in a fescue meadow, and reached the same conclusions as Curry. However, in contrast to the results with foliar litter, these scientists also showed that the fauna slightly accelerated decomposition of buried roots. Thatch accumulation in our long-term fungicide plots (Smiley and Craven, 1978) was considered to be associated with inhibition of the microflora, and not earthworms, by some of the fungicides.

In my view, microorganisms have been demonstrated to be the most important organisms for decomposition of plant litter, and inhibition of the fauna in grassland ecosystems has been of only minor consequence. It is also my view that earthworms can be considered as indicators of overall soil faunal activity, and that their absence is an expression of imbalance in the ecosystem. Tissue decomposition rates may be reduced under these conditions, without the necessity for a cause and effect relationship with earthworms *per se*. More detailed research is needed on this topic.

Pesticides

Some pesticides can alter the rates of production for turfgrass tissues, and some can alter the rates of decomposition. Pesticides that reduce the activity of soil microorganisms are most inhibitory to litter decomposition. Many insecticides, herbicides and fungicides can alter the activity of microorganisms such as fungi, and may also inhibit the activity of fauna such as insects and earthworms. The overall effects of pesticides are very complex. Thatch accumulation on turf that is regularly treated with certain fungicides, herbicides, and insecticides is well documented (Beard, 1973; Beard, 1976; Smiley and Craven, 1978). Effects of these chemicals on the soil microflora and fauna are not as well known (Beard, 1973; King and Dale, 1977; Meyer et al., 1971; Smiley and Craven, 1979).

Fertility

Nitrogen is essential for decomposition of organic litter. Microorganisms require a carbon-to-nitrogen ratio of at least 25:1 for effective decomposition (Beard, 1973). Organic litter is rich in carbon and lean in nitrogen. Furthermore, nitrogen is quickly and easily leached out of the thatch (Hunt, 1978), and the C:N ratio of thatch can therefore become rather high. Litter decomposition is independent of the nitrogen in soil below the thatch because this nitrogen is out of reach for the microbes in thatch (Hunt, 1978). Thatch decomposition is accelerated when soil is incorporated into the thatch layer (by coring and matting or by soil faunal activity) and when frequent, light applications of fertilizer are applied (Beard, 1973). The biological bases for such observations are provided in detail by Hunt (1978) and Smith (1979). Beard (1976) explained that the nitrogen application frequency and the type of carrier must be manipulated to keep nitrogen up in the thatch. Smith used eloquent mathematical models to predict that decomposition will be most efficient when split applications of water-soluble nitrogen are made, or when a single annual application of water-insoluble (slow release) nitrogen is made. Hunt (1978) illustrated how decomposition can be slowed whenever nitrogen concentrations in the thatch are reduced. Topsoil (but not sand) incorporated into thatch will help to elevate or prolong the available nitrogen supply (Beard, 1973). Care must also be taken to avoid excessive fertility levels which greatly increase tissue production rates, but not decomposition rates.

Acidity

Litter decomposition proceeds most rapidly at pH 6.0 (see Beard, 1976), and the rate decreases rapidly as either the acidity or the alkalinity is increased (Fig. 2B). If lime or neutral to alkaline soil are not added to turf, the alkaline components of litter may be leached downward, and the thatch will become acidic. Frequent, light applications of lime are necessary in many regions to maintain a proper pH balance in thatch (Beard, 1973). Infrequent heavy applications of lime appear to be capable of reducing the rate of thatch decomposition.

Temperature

All biological activities are temperature dependent. Production of tissues may be reduced or stopped during cold winters and hot summers. Shoot and leaf production are retarded earlier and more positively than root production (Beard, 1973). Tissue decomposition occurs at its maximum rate at 38°C (100°F) and is completely stopped at 0°C (32°F) and 45°C (113°F) (Hunt, 1978). The thatch temperature is quite responsive to air

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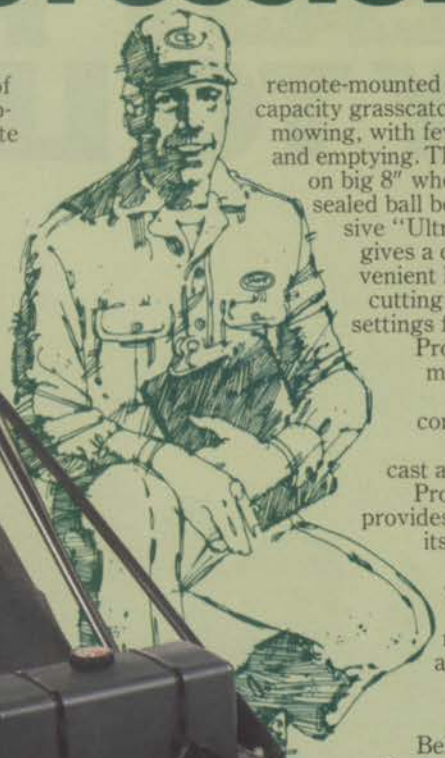

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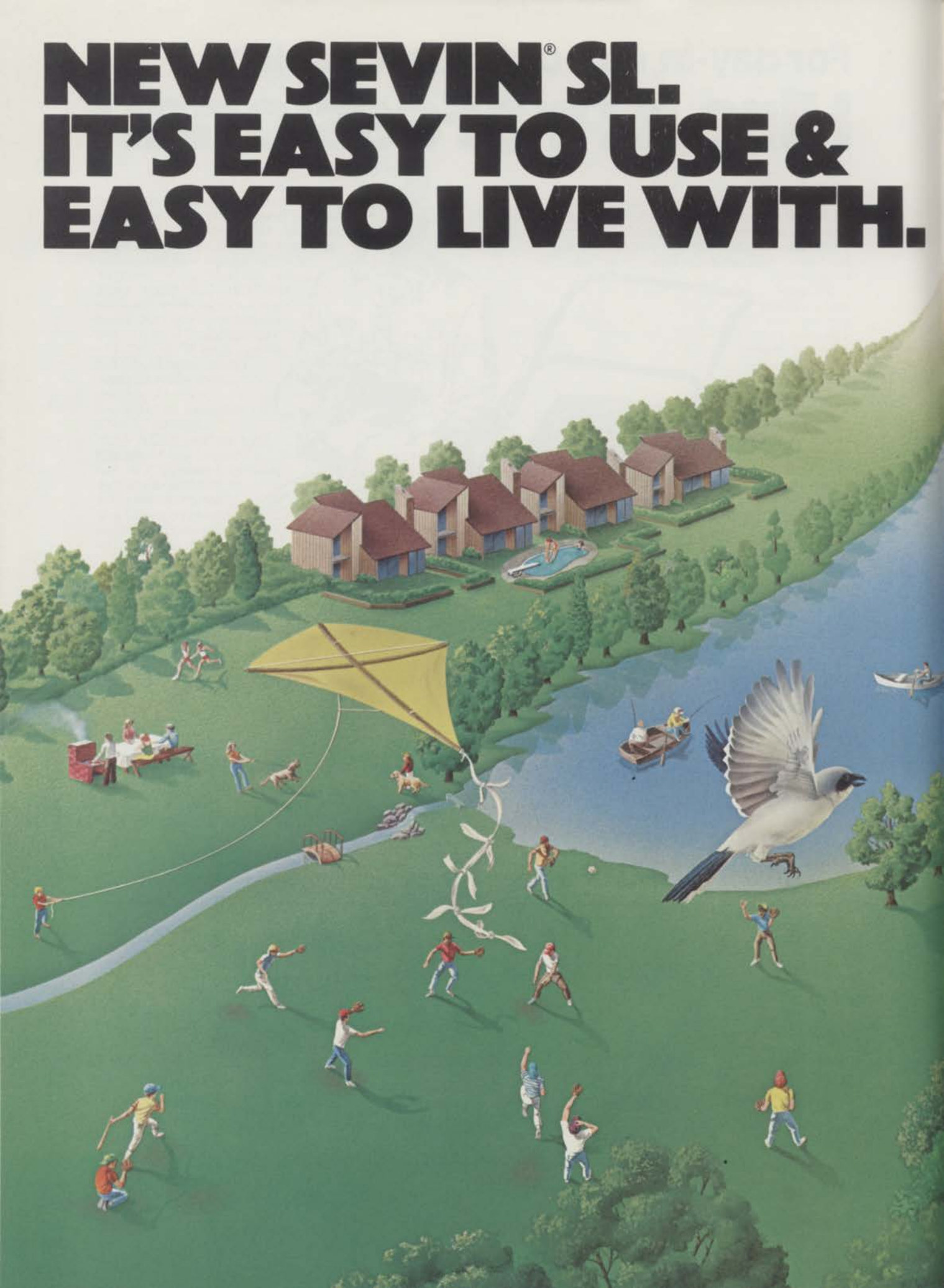

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DRAINAGE DESIGN TO HANDLE INTENSIVE FOOTBALL FIELD USE

By John Moreland, CGCS, President, Cambridge Soil Services of America, Glencoe, Alabama

The intensive use of football fields today makes proper construction and drainage critical. Many options are there to correct drainage mistakes depending upon the budget of the owner.

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As you can see, with a million dollars you have lots of options, but let's suppose that you don't have a million dollars, or a half a million, or a quarter of a million. In fact your budget for field renovation is on the short side of $50,000; so what can you do? You have two options: You can improve the drainage of the field you have, or you can continue to play in the mud.

There is no cause for despair. Most athletic fields in the United States could grow good mud-free turf if they were properly drained, properly maintained and not over used. Fifty thousand dollars is usually sufficient to install an outstanding drainage system on an existing field. I say "usually" because there are exceptions, such as bed rock within a foot of the surface, a water table within a couple of inches of the surface, or a field in a bowl with no outlet. Barring such freak situations, you should look forward to excellent drainage.

The first step is planning. You have to decide whether to do the job yourself or whether to seek outside help. If you plan to tackle the job yourself, just be sure you understand how the various components of a complete drainage system are interrelated. Reading this article will help.

Let's assume you have decided to get help. Your odds on getting competent help are not very good, unless you understand something about sportsturf drainage. There are many drainage engineers, landscape architects, and landscape contractors who are competent to design and/or install excellent drainage systems. Unfortunately, most of the people doing this work simply do not understand the rather special requirements of sportsturf. The proof of this statement is the fact that most of the natural turf football fields in the United States are grossly inadequately drained, even though many of these fields have been designed by reputable landscape architects and built by reputable contractors who employed reputable drainage engineers. There is, of course, no reliable way of being sure that you have hired the best help, but here are some questions you can ask that will shorten the odds:

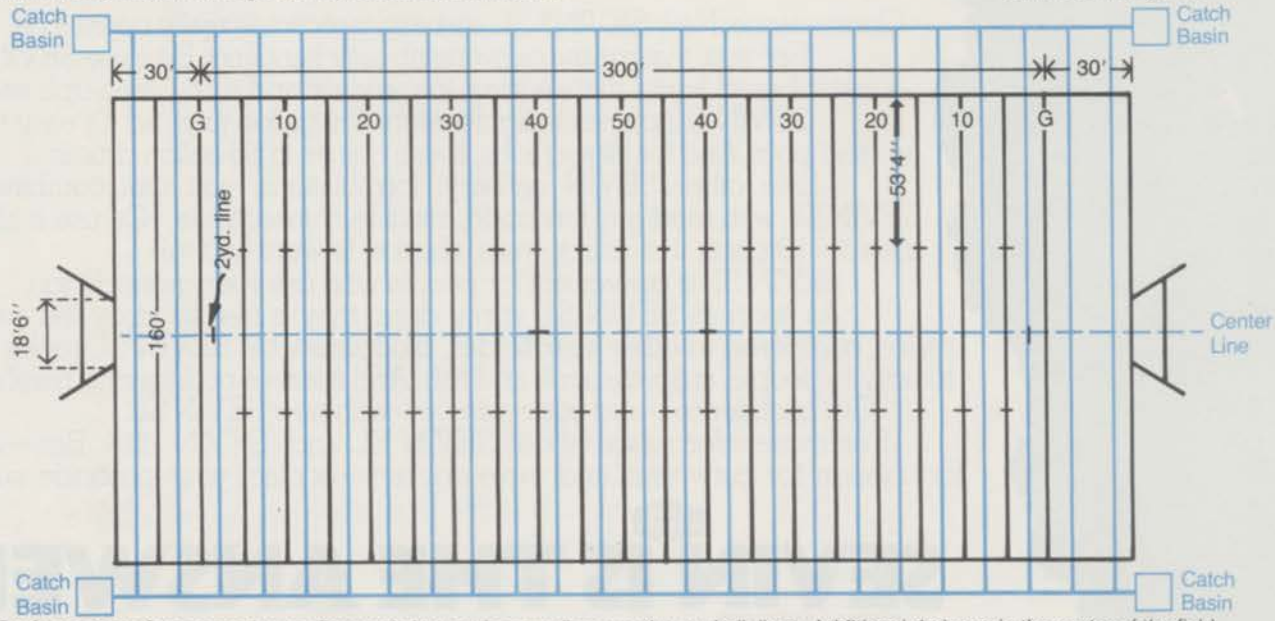
"What makes water move in sportsturf?"

If your consultant replies "gravity," keep looking — you have not found your man. The correct answer is gravity and capillary attraction. An answer of gravity and the forces of adhesion and cohesion would also be acceptable. A simple answer of "gravity" indicates a simplistic approach to a complex problem.

"Are you familiar with USGA specifications for golf green construction?"

If the answer is "No," your consultant is probably

Continues on page 48



Drainage trenches spaced every five yards but not in same line as paint or chalk lines. Additional drainage in the center of the field may be desirable.

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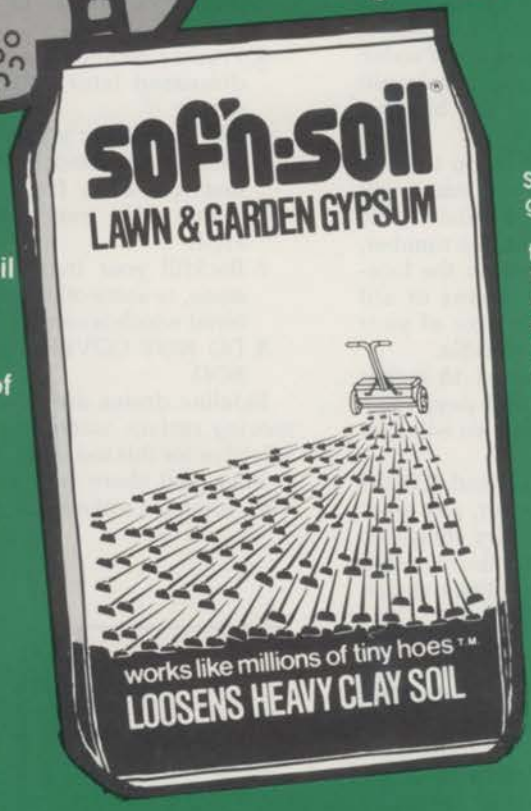

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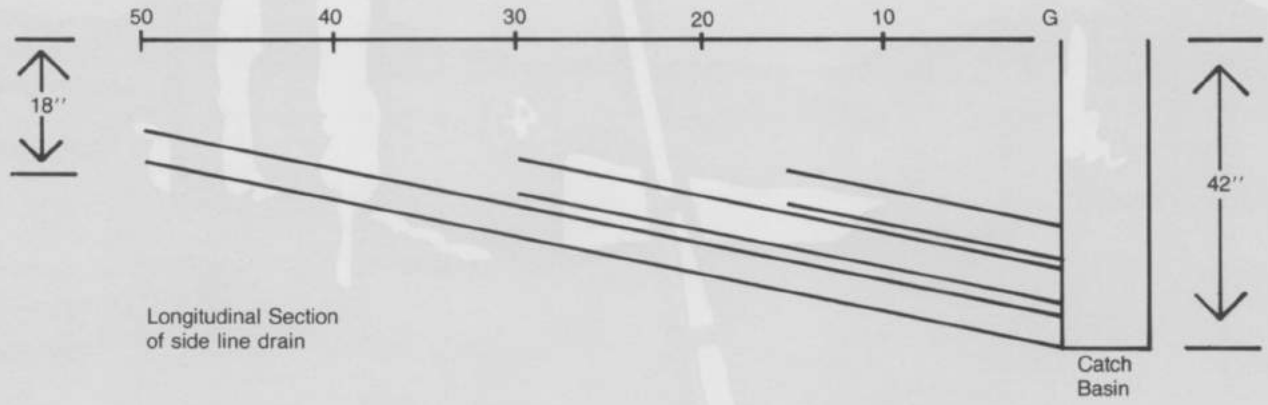
Drainage *from page 46*



Sideline drains and field drains must have a slope of at least 1 percent.

insufficiently read on sportsturf drainage. If the answer is "Yes," ask the further question: "What is the purpose of the gravel blanket in a USGA green?" If the answer is "to improve drainage," keep looking. On the other hand, if he answers, "To conserve water when supplies are deficient and remove the excess when water is abundant," and if he can now explain to you how this is so, things are looking up.

"What drains better, all sand (A) or sand mixed with stone(B)?"

If he answers "A" and can explain why, maybe you have found your man. In "B" the capillary attraction of the sand acts as a barrier blocking the passage of water. In "A" the sand is deep enough to develop a hydraulic head sufficient to overcome much of the blocking effect of capillary attraction.

Let us assume you have decided to do the job yourself. Of course, the actual system you install will depend on many factors such as the availability of various materials and their relative cost, the number, location and depth of existing catch basins, the location and depth of existing French drains or slit trenches, the crown of the field, the size of your budget, and the equipment you have available.

We will assume your field is crowned 18 inches (which is ideal) and that you have a 42 inch deep catch basin near each corner of the field. Later we will consider alternatives.

Drainage work should start at the lower end. If this is done and you are caught by wet weather, any work which has been completed will help dry things up when the rainy spell is over. If you start at the high end, no part of the system can work until the entire system is finished.

Since we assumed that catch basins were in place and of adequate depth, your first step would be to start with the sideline drains. These should be located several yards outside the playing surface and should be at least 18 inches deep at the shallow end, and should slope toward the catch basins with at least a 1% slope. Although larger sizes of pipe are often used, we prefer four-inch perforated plastic pipe since we object to a wide trench.

If additional capacity is needed, stack four-inch pipes on top of another. Allow one pipe for each 15 yards to 20 yards of side line drained. If catch basins were also available at the 50 yard line, this would reduce the pipes required. Other circumstances could increase the number.

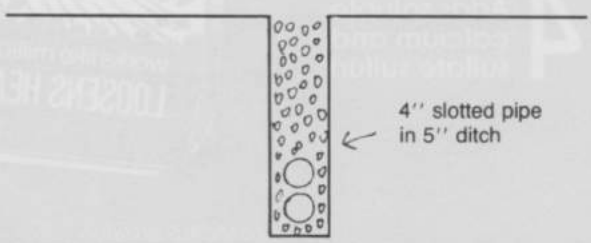
Keep in mind these points.

1. Minimum depth should be at least 18 inches.
2. Slope should be at least 1% if possible.
3. Use one perforated flexible corrugated 4-inch pipe for each 15 to 20 yards of side line trench. Openings in pipe should be slightly smaller than the backfill material.
4. Start your trench at the catch basin and dig uphill.
5. Provide connections for crossfield drains (to be discussed later) when installing the sideline drains.
6. Use a trencher which is modified to dig a clean trench with a smooth bottom with the spoil deposited well away from the trench. Adjust it for a 5-inch wide trench. DO NOT USE A BACKHOE.
7. Backfill your trench with pea gravel, crushed stone, or some other stable, highly permeable material which is compatible with the pipe used.
8. DO NOT COVER TRENCH WITH SAND OR SOD.

Sideline drains are intended primarily to remove moving surface water (see diagram). They are very effective for this use only.

Your next chore is to install crossfield drains and here you have some decisions to make. The effective-

Continues on page 50



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ness of slit trenches in removing underground free water and loosely bound water is proportional to

$$\frac{\text{depth of trench}}{\text{distance between trenches.}}$$

Trench width is immaterial. We refer to the above ratio as the DI (drainage intensity) rating of the field. Thus a field with trenches two-feet deep on four-foot centers would have a DI rating of 2/4 or .5, which is very good.

Since in this example, your sideline trenches had a minimum depth of 18 inches, it would be well to dig your crossfield trenches to this same depth. We suggest that you use two-inch pipe designed for direct burial in sand. For backfill we recommend a uniform medium sand (1/4 to 1/2 mm or 32-60 mesh). A suitable alternative would be a uniform course sand. A third choice would be a concrete sand. Mason sand should be used only if it has been tested for permeability and for compatibility with the particular pipe. Under some circumstances you might wish to use 2mm to 4mm grit instead of sand, but in this case, you must use a pipe with larger openings.

The trench is filled close to the surface with the grit which is topped with about the same size calcined clay. The pipe must not be laid in grit or gravel since soil particles could pass through the gravel and block the tiny slits. Pipe which has larger openings should be used in gravel.

Do not try to improve the drainage of the soil by adding sand and mixing it with existing soil.

Your next step is to figure out the cost per foot of trench and to compare this with your budget. This will enable you to determine how many feet of drain you can afford. Ideally you would want uniform close spacing over the entire field. If you cannot afford this, then at least design the most used portion of the field to a DI rating of .33. Figure 5 is one such design.

If your budget is too slim to cover this pattern, then simply work on the wettest or most used areas of your field this year and plan to add more trenches in future years.

Two ways to supplement trench drainage are sand injection and sand grooving, processes developed by Cambridge Soil Services of America.

Sand Injection is our process of injecting a nine-inch-deep, .6 inch wide band of sand into the soil. Because costs per lineal foot are dramatically less than slit trenching, it is economically feasible to place the slits close enough to obtain DI ratings as high as 1, although we would typically use a spacing of 18 inches yielding a DI rating of .5. Sand Injection is most effective if combined with slit trenches which ideally should be on 7½ foot centers, although 15-foot centers would be quite acceptable.

Sand Grooving is our process of cutting four-inch-deep, .5 inch wide grooves in the turf and backfilling the grooves with sand. Since the grooves are on eight-inch centers, this yields a DI rating of .5. Our Sand Groover can be adjusted to simultaneously top dress the field with sand. This should be done whenever practical since sand topdressing is the best way to preserve the integrity of the sand grooves, the injection slits and the slit trenches.

Working with a flat field complicates things a bit but the same principles apply. Since your drainage will inevitably be slower, there is no longer any need for stacked sideline drains; a single four-inch perforated pipe in gravel will be sufficient. Since the field is flat, the crossfield drains must be dug deeper at the sidelines than in the center. In designing your system, bear in mind that the depth at the shallow end should generally be 18 inches and that a slope of 1% is desirable, but slopes as low as one half of 1% can be tolerated. Although in theory the same formulas apply, in practice a more intensive drainage system is required to achieve the same degree of dryness because the drainage system must handle the surface water as well as the subsurface water. On a flat field, sand top dressing and dressing out depressions with sand are also more important than on a crowned field.

A crowned field is clearly preferable to a flat one. If your field is flat, it will probably be more cost effective to increase the intensity of the drainage than to crown the field. If your field is so irregular that it requires extensive regrading, then it would probably be well to crown your field in the process.

A word of caution - *do not try to improve the drainage of the soil by adding sand and mixing it with existing soil.* This will generally make the drainage worse, not better. Internal drainage is dependent on soil pore space. Uniform coarse sand will have perhaps 40% large pore space and will drain very well while uniform loam may have 40% pore space most of which is very small and will drain very poorly. If we mix sand into the loam, we do not increase the size of the pore spaces but simply reduce the number of pore spaces present. See figure 6.

You have no doubt read of the harmful effects of a layered soil. These bad effects are very real and very serious but they stem primarily from having a layer with many small (capillary) pore spaces over a layer with few capillary pore spaces and many large pore spaces. A layer of uniform medium sand over sportsturf will not produce the undesirable effects associated with a layered soil.

Our final minor point, paint clogs soil pores. If your slit trenches are located exactly on the five yard lines, in time they will likely become clogged with paint. It is easy to modify a sod cutter to remove a 4 inch wide 2 inch deep strip. The top 2 inches of your slit trenches should be replaced whenever they become clogged.

Placing the slit trenches exactly on yardage strips will cause them to become clogged more quickly but even if they were placed elsewhere you would still have the clogging of the soil on the yardage stripes and this soil should be replaced whenever the turf deteriorates. Of course the slit trenches can become sealed by play in wet weather, but if you have followed the design set forth in this article, any clogging which does occur will be limited to the top two inches and can be easily remedied as explained above. Of course a better procedure is to prevent clogging in the first place. This can be accomplished by a regular program of sand top dressing. **WTT**

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News *from page 13*

jobs in the second cutback by Toro. The company did not pay a dividend in the last quarter.

Cantu, formerly president of the ProTurf Division of O.M. Scott and Sons, is a warm, personable man with more than ten years experience in the turf industry.

Toro was an impressive, growth oriented firm until recession and lack of snowfall cut earnings. Between 1976 and 1979, Toro's sales increased from $130 million to nearly $360 million. In 1980, sales still increased to $402 million.

Toro Chairman David McLaughlin has been considered one of the most dynamic business leaders in the country and has received considerable coverage by the business press in the last three years. McLaughlin said the company will take a more conservative growth strategy in the future.

Dartmouth's search has taken more than nine months and included 400 candidates. McLaughlin assumes his new post in June 1981. He missed the announcement of his new job in New Hampshire so that he could personally explain to the Toro board his move.

McLaughlin announced to the Board of Directors in late February that he has accepted the post of president of Dartmouth College, Hanover, NH. McLaughlin, a 1954 graduate of Dartmouth, has long been active on the college's board of trustees and served as chairman.

CORPORATE

Melrose, Keating assume reigns after Toro shakeup

The Toro Company, faced with a total management restructuring after the departure of David McLaughlin and Jack Cantu, has selected ten-year Toro veteran Ken Melrose, 40, as president. Stephen Keating, 62, former chairman of Honeywell and director of General Mills, PPG Industries, and Donaldson Co., will serve as chairman of Toro's executive committee.

Melrose replaces Jack Cantu as president. He was most recently executive vice president of Toro's equipment division. He joined Toro in 1970 as director of marketing and served as president of Game Time, a Toro subsidiary for three years. Melrose graduated from Princeton University in mathematics and electrical engineering. He

Continues on page 57

AW, CUT IT OUT

Terraclor for Rhizoctonia Control	Southern Pine Seedlings: Rhizoctonia Needle Blight	Camellias: Flower Blight	Azaleas: Petal Blight	Bedding Plants: Stem Rot	Bulbs: Crown Rot, Black Rot	Easter Lilies: Root Rot	Roses: Botrytis Storage Rot	Lawn Grasses: Brown Patch

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New Toro President Kendrick Melrose

received a master of science from Massachusetts Institute of Technology and a master in business administration from Chicago University.

Melrose was a track letterman at Princeton and has been a very active supporter of The Children's Theatre Company.

Keating has been a member of the Toro board of directors since 1966. Other credits include chairmanship of the Federal Reserve Bank of Minneapolis and a board member of the Mayo Foundation.

TURF

Athletic field needs debated at Nebraska

Coaches, field managers, and turf specialists weighed natural and artificial alternatives for athletic fields during the Nebraska Turfgrass Conference and Show, Jan. 12-14, in Omaha.

Concerned that many Nebraska high schools are signing orders for artificial surfaces, turfgrass specialists urged field managers to review their natural turf programs for improvement.

John Melton, assistant coach of the Nebraska Cornhuskers football team, told conference attendents that players must wear pads everywhere, withstand the pounding from falling on the hard artificial surfaces, and take the impact that natural turf would absorb on knees and ankles. Melton said, however, that it's easier to coach on artificial surfaces, these fields can be used more intensively, and aren't turned to soup in heavy rains. Still, Melton states the conversion from natural to artificial turf "is a big mistake."

To improve the endurance of Lincoln's Seascrest Field, manager Mike Callaghan overseeds every third game and aerifies after the close of the season. Callaghan also dethatches the field. One of the first steps he took when he assumed responsibility was to improve the drainage.

Nebraska extension turf specialist Robert Shearman stressed annual renovation for intensively used fields, fertilization three or four times per year, and control of persistent weeds.

Richard Hurley, research director for Lofts Pedigreed Seed Co., said perennial ryegrass is the best value for use on athletic fields. If use can be limited to once a week, then Kentucky blue-

Continues on page 68

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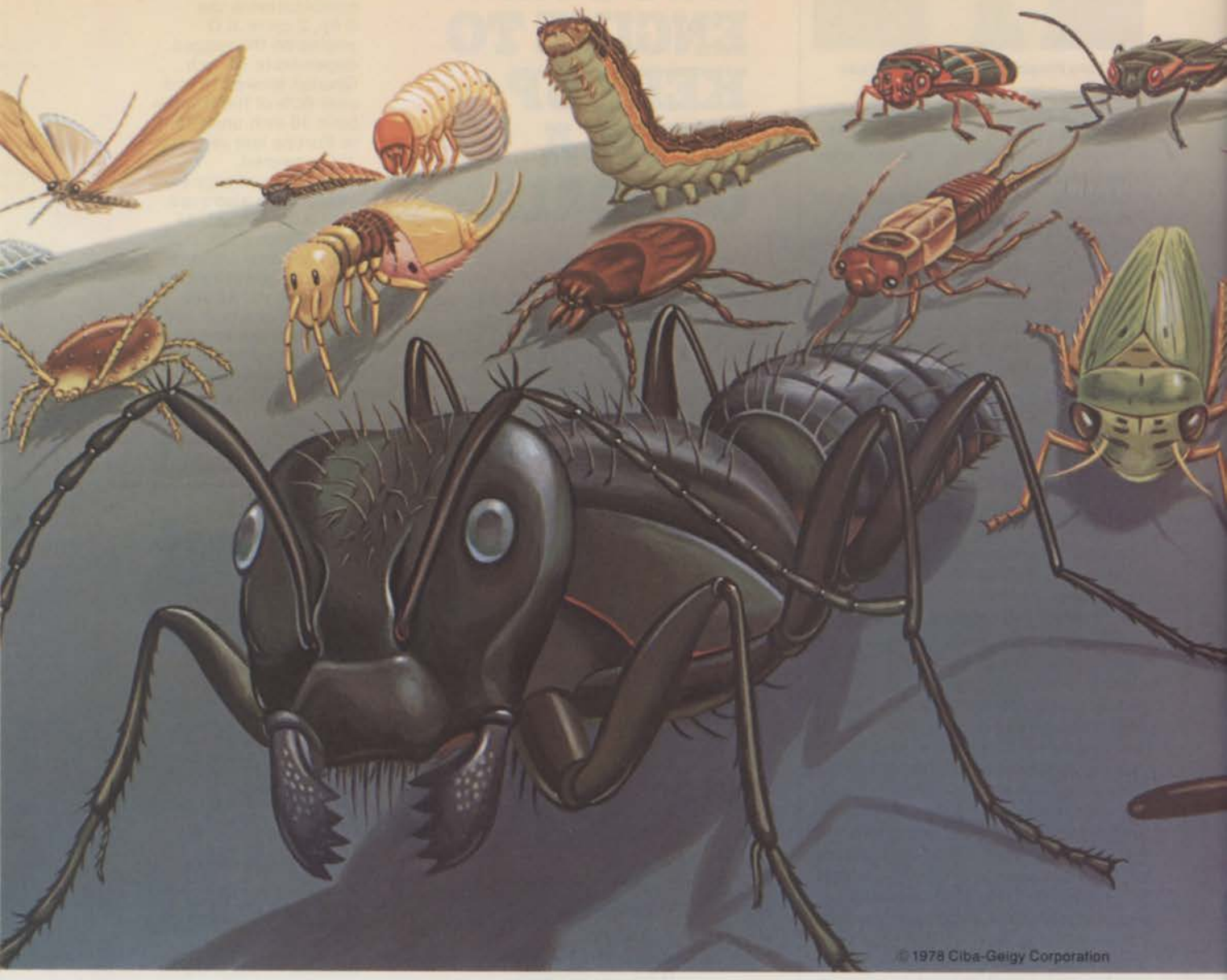

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temperatures and to the cooling or heating that is governed by radiation and by evaporation of water. Temperatures presumably limit litter decomposition rates very commonly.

Moisture and Aeration

Poor aeration (excess water) and surface drying are associated with thatch accumulation (Beard, 1973). Ulehlova (1973) indicated that decomposition processes are essentially stopped in dry litter. She also indicated that the decomposition proceeds for a short time during overly wet conditions, but is soon halted by the accumulation of toxins produced when decomposition occurs under conditions of low oxygen. The toxins persist for some time even after aeration is reestablished, and thus act to extend the time of inhibition. Hunt (1978) has described the moisture conditions which limit decomposition. Peak levels for decomposition are narrow (ca. -1 to -5 bars). These limits are stated in terms of water energy levels, and are therefore difficult to portray in readily understood terms. Suffice it to say that thatch that appears even slightly dry will probably be in the -15 to -100 bar range, and thatch which glistens with moisture when squeezed tightly will be in the 0 to -1 bar range. Turf is fully capable of growth when thatch is extremely dry, because the roots extract water from lower in the soil profile. Moisture can therefore limit thatch decomposition in turf during wet or dry periods.

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Summary

Thatch is commonly associated with the use of intensive management practices on turfgrasses. But most of us have also had to address thatch accumulations on turfs that receive very low levels of management. These turf areas are seldom irrigated, limed or fertilized, and are therefore often inhospitable to the activities of microorganisms in the thatch layer.

Furthermore, low management turfs often have lower levels of leaf, stem and root production than found in high management turfs. Smith (1979) predicted that at tissue production rates below a certain broad minimum, the amounts of decomposer microorganisms will become restricted by a lack of available carbon, and that plant litter will begin to accumulate. At production levels above the minimum the amounts of tissues produced simply outstrips the ability of microorganisms to keep it decomposed. These principles indicate that a moderate level of management may be best adapted for control of turfgrass thatch. More research is obviously necessary, but there appears to be no reason to believe that thatch is only a high management problem.

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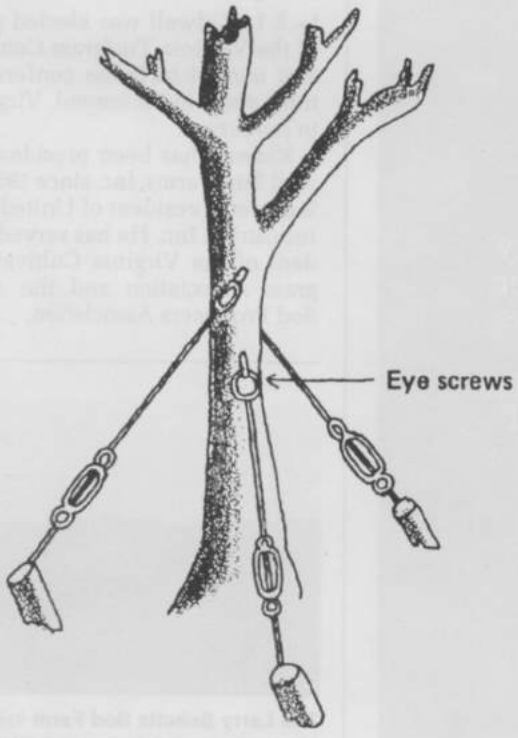
VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *Several 8-inch caliper trees are being installed in our park, and the contractor plans to guy the trees by using three lag (anchor) bolts screwed into the trunk approximately 1½ inches at various levels. Is this an accepted practice of guying, and will this harm the tree in any way? (New York)*

A: Our policy is not to use guys unless absolutely necessary. Trees with freedom of movement respond with better root development in a shorter time period. Also, if a tree is located in a park or other public location, children swing on guys and loosen them; and mowing around the trees can be a problem. Guys may be necessary, however, in a windy location or where the soil is too loose to support the tree properly.

The use of lag bolts or eye hooks to anchor support wires is an established practice on trees larger than two inches in diameter. After the tree has established (usually one to two years) the lags should be cut flush with the trunk or removed and the hole filled to facilitate proper callusing. Although holes drilled into the trunk increase the potential for decay, this system of guying appears to cause less injury to large trees than a wire or cable attached to the tree by passing it around the trunk. Even when the wire is covered by a plastic or rubber hose, it places a constriction on the cambium and sapwood at the point of contact. Often the trunk appears swollen where the hose loops around it due to excessive growth from accumulated carbohydrates.



Q: *How can I save my grass from dogs? And how can I bring back the brown spots that are already present? (Illinois)*

A: Please refer to the December 1980 Vegetation Management column for the first part of your question.

Since turf injury is caused by excess soluble salts in the urine, any treatment effective on turf injured by fertilizer or deicing salts will also be effective on dog spots. Drenching the affected areas will help leach the salts below the root zone. If the turfgrass is still alive, new shoots will emerge from the crown area. If the turfgrass is dead and the spots are over 6 to 8 inches across, you should consider scarifying the soil and reseeding.

Q: *This past season we had a disease problem identified as leaf blight in several pachysandra beds. How can we control this disease if it occurs this year? (Pennsylvania)*

A: Although there are several leaf blights or leaf spots that attack pachysandra, the most serious is caused by *Volatella pachysandrae*. The leaves first develop brown blotches, followed by numerous stem cankers and blight of entire plants. Plants are more susceptible following winter injury or an insect infestation of scale insects.

Since the disease can spread rapidly from one plant to another, thin the stand periodically to prevent dense growth. Rogue and destroy severely diseased plants and avoid the use of heavy, damp mulch which encourages disease development. Inspect the underside of the leaves for scale and, if present, control with superior oil while the plants are dormant or with malathion in mid-May.

Fungicide applications to control the disease should begin when new growth starts in the spring. Spray thoroughly with ferbam or captan or mancozeb two or three times at 10-day intervals.

Q: *If trees were dug in late fall and stockpiled, would the roots have time to harden off before freezing temperatures occurred? The trees were not mulched. (Ohio)*

A: Roots normally are the most sensitive part of a tree to cold temperatures and they do not harden more than a few degrees. Trees stockpiled over winter in cool climates should be mulched.

Q: *How much harm is done when trees bleed after spring pruning?*

A: I am not aware of any evidence indicating that the loss of sap through pruning cuts will cause injury to trees. Maples and birches have been tapped for decades without apparent injury.

Send your questions or comments to: Vegetation Management c/o WEEDS TREES & TURF, 757 Third Avenue, New York, NY 10017. Leave at least two months for Roger Funk's response in this column.

SOD PRODUCER NEWS

Sod producers welcome 450 to midwinter conference

The all-around annual program of managing a business was supplemented this year by equipment exhibits at the American Sod Producers Association conference in Lake Tahoe, Nevada, Feb. 16-18.

Some 450 sod growers and spouses listened to talks on how to update their business, investigated equipment and services which were presented for the first time at midwinter conference, and planned for next year's show in Maui. The Lake Tahoe setting provided a beautiful backdrop for two full days of educational sessions and attracted many growers from southern climates.

Energy was an important theme and many speakers referred back to the address of the first speaker, Dr. Victor Gibeault, turfgrass extension specialist for the University of California-Riverside. He spoke about experiments and research with grasses which don't need as much water and others which grow shorter and don't require as much mowing. Dr. William Meyer, research director for Turf-Seed, Inc., reiterated this theme in his talk, "New Turfgrass Varieties for Sod Production."

William Harding, legal counsel for ASPA, spoke about legal developments for the organization and how to deal with state agencies. He urged members to have input with ASPA headquarters on state issues so all members might be aware of problems and take advantage of legal assistance in coping with them.

Another consultant for ASPA, Dennis Marx of Ernst & Whinney, reviewed some areas with which his accounting firm is assisting the sod growers. One project consists of analyzing ASPA's membership to gain a profile of the sod industry and its related fields.

The last speaker, John Tate, a senior law partner in the law firm of Tate, Bruckner & Sykes, spoke about labor laws and employee relations. He said that many small and moderate-sized businesses wouldn't get into labor problems if they understood what unions promise. There would be no labor problems if employers looked at their crew's needs and responded to them.

Along with other business and cultural talks and split sessions on warm and cool season grasses, the banquet attendees heard former quarterback Roman Gabriel, now head coach at Cal-Poly U. Gabriel said playing on artificial turf was like being hit twice, once by a tackler and once by the turf. He said if you questioned the players, not one would vote for artificial turf.

In a surprise presentation at the banquet, Dr. William Daniel, turf specialist at Purdue University, was given a plaque and awarded an honorary member for his work with ASPA and for being one of the orginators of the association.

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Kidwell becomes Virginia turf head

Jack L. Kidwell was elected president of the Virginia Turfgrass Council at its 21st annual turfgrass conference and trade show in Richmond, Virginia held in January.

Kidwell has been president of Kidwell Turf Farms, Inc. since 1959, and he is current president of United Bio-Fuel Industries, Inc. He has served as president of the Virginia Cultivated Turfgrass Association and the American Sod Producers Association.

The Larry Schultz Sod Farm in Rochester, Minnesota, grows nursey sod on mineral soil with an 8 percent slope. Terraces are 3 and 6 feet tall.

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The Land Reclamation Report

Documentary shows waterway project

A film about the largest earth-moving project in the country, the construction of the $1.6 billion Tennessee Tombigbee Waterway in the southeastern United States, is available from International Harvester Construction Equipment Group.

The film shows how 64 International 350B off-highway haulers move 95 million cubic yards of earth in five years. When completed, the project will considerably shorten the shipping routes of 14 south central states to the Gulf Coast seaport of Mobile, Alabama, making transportation of goods more economical.

The first half of the film covers the excavation work and shows the fertilization of native grasses and shrubs and the restoration of wildlife and trees. The second half emphasizes the recreational and economic benefits of the project. The governor of Mississippi appears and talks about reconstruction, environmental, and economic growth.

This waterway will provide the area with 42,000 acres of lakes and 13,000 acres of land for recreational facilities, which are expected to attract 4 million visitors annually.

The film includes aerial scenes and animated maps. It comes in 16mm, super 8mm, and videotape format and may be purchased from International Harvester Product Support Center, 2201 Estes Avenue, Elk Grove Village, IL 60007.

U.S. soil losses would cover Iowa

Erosion robs the U.S. of enough soil each year to cover the state of Iowa with a layer one inch thick, and this often comes from the best land, say experts with the U.S. Department of Agriculture.

Farmers, ranchers, and conservation specialists with USDA agencies have stepped up their fight to check the huge soil losses, which equal 5.5 billion tons. Conservationists warn that with so many mouths to feed in the world, failure to better protect the topsoil eventually would mean hunger for millions.

"Soils being taken by erosion generally are the richest in nutrients and organic matter and have the most favorable conditions for plant growth," says Norman Berg, chief of the USDA's Soil Conservation Service. "This constitutes a significant drain on the productive potential of land where our food is produced."

Much soil loss has occurred because of the recent drought and last summer's long stretch of 100-degree-plus days that beat down on the Great Plains. Figured at 1979 prices, USDA soil conservation specialists estimate that putting all of the lost nitrogen and phosphorus and one-fourth of the lost potassium back into the damaged land would add up to $18 billion in just one year.

Mobil Oil to mine and reclaim Wyoming site

Mobil Oil Corp. plans to mine about 317 million tons of coal over a period of 24 years at the proposed Rojo Caballos mine in Campbell County, Wyoming.

On the basis of public comment received on the draft impact statement and the technical analysis of the mine plan, stipulations are being proposed to bring the mine plan into compliance with the Surface Mining Control and Reclamation Act of 1977 and other applicable Federal and State requirements.

West Virginia will receive $30 million

The Interior Department's Office of Surface Mining (OSM) has approved the Abandoned Mine Land Reclamation Plan for West Virginia, making the state eligible to receive approximately $30 million in reclamation funding.

The State's reclamation division estimates a total cost of reclaiming the land and streams affected by past mining practices at over $5.6 billion. The money the State is eligible to receive comes from fees charged to active coal mine operators under the Surface Mining Control and Reclamation Act of 1977.

Other awards to states include:

- $2.3 million to Ohio for regulation of surface coal mining activities,
- $1.1 million to three counties in southeastern Kentucky to correct mine reclamation problems restoring mines,
- $470,000 to Virginia to continue enforcement of its interim program,
- $448,000 to Colorado for its first annual submission of abandoned mine lands reclamation projects, and
- $200,000 to New Mexico to help small coal mine operators apply for permits to mine under the Surface Mining Control and Reclamation Act.

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grasses have time to fill in scarred areas, Hurley said.

A major conflict with athletic fields is they are used most heavily at the best time of year to seed, August and September, or the second best time, early spring. As a result, Hurley said, most fields are dormant seeded between Thanksgiving and Christmas. Seeding prior to the last game of the season will allow traffic to work the seed to the surface.

Shearman said the choice of turfgrass is reduced to tall fescue if maintenance is low. Hurley pointed out that improved tall fescues are making more desirable, durable playing surfaces than older varieties.

CONFERENCE

Lawn care cited for bigger turnout

Turfgrass associations all over the country report record attendance at this year's conferences and trade shows. Part of the increased turnout is due to the growth of the lawn care industry.

Dr. David Wehner of the Department of Horticulture of the University of Illinois, says, "Each year more people are being graduated with degrees in the (lawn care) field, and they maintain contacts with the universities and the turf organizations. This is how we help foster our own programs."

Also, many conferences now schedule special sessions to meet the needs of lawn care people.

The Virginia Turf Show, Jan. 20-22 in Richmond, which had never had lawn care sessions before, combined a trade show and complete lawn care program. Attendance, including speakers and exhibitors, was 516, the largest ever recorded. The association is entering areas such as highways and sod production and may plan a special program on cold-tolerant bermudagrass.

The 21st Illinois Turfgrass Conference attracted about 670 people to the Prairie Capital Convention Centre in Springfield, Illinois, from December 16-18.

The conference opened with concurrent workshop sessions on financial planning and on various turfgrass problems—weed, disease, and insect control.

On the second afternoon, there were split lawn and golf turf sessions, followed by a banquet at the Springfield Hilton Hotel. Orion Samuelson, vice president of WGN-Continental Broadcasting System, delivered the keynote banquet speech on the importance of turf and horticulture to the American way of life.

The New Jersey Turfgrass Association marked its 10th anniversary with an Expo '80 at the Cherry Hill Hyatt House in Cherry Hill, New Jersey, from December 8-11. A record number of 1,200 people attended.

Dr. Henry Indyk, the association's general chairman, said, "We arranged the sessions consecutively so that talks, exhibits, and the trade show didn't compete. People could sit for two hours, then walk around at the exhibit. If you've been listening to speakers all day, your retention capacity goes way downhill by 4 o'clock."

The meetings began with an afternoon workshop on insect identification. The following day, a general session was held. On the third and fourth day, there were split sessions on golf and fine turf and on lawn and utility turf. A special session was held on the last afternoon for pesticide applicatory certification.

EQUIPMENT

MTD to purchase Harvester's Cub line

International Harvester's Agricultural Equipment Group has reached agreement with MTD Products Inc. of Cleveland, Ohio, to sell its Cub Cadet line of lawn and garden tractors. MTD will establish a new subsidiary, Cub Cadet Corp., to produce and market the line. International Harvester dealers will continue to market the Cub line as well in more than 2,000 dealerships in North America.

MTD is one of the largest manufacturers of mowers, tillers, and other outdoor equipment in the U.S. A sizeable portion of its products are marketed under the brands of large retail chains. The company introduced a professional series of products this year. The Cub Cadet line will strengthen its position in the homeowner and small commercial markets. The company will manufacture the Cub line at a plant recently constructed by International Harvester in Brownsville, TN.

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EVENTS

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 757 Third Ave., New York, NY 10017.

35th Annual SE Turfgrass Conference, Coastal Plain Station, Tifton, GA, **Apr. 13-14.** Contact Dr. Glenn W. Burton, Research Geneticist, University of Georgia, Coastal Plain Station, Tifton, GA 31793, 912/386-3353.

Southern California Turf & Landscape Institute, Anaheim, CA, **Apr. 14-15.** Contact Ed McNeill, Southern California Turfgrass Council, 1000 Concha Street, Altadena, CA 91001, 213/798-1715.

Texas ASLA, Chapter meeting and trade exhibit, Hyatt Regency-Fort Worth Hotel, Fort Worth, Texas, **Apr. 29-May 2.** Contact Monica Schwanitz, 1100 Macon Street, P.O. Box 2973, Fort Worth, Texas 76113, 817/333-2611.

Annual Meeting of the American Boxwood Society, Blandy Experimental Farm, Boyce, VA, **May 13.** Contact The American Boxwood Society, Box 85, Boyce, VA 22620.

Second Annual Menninger Flowering Tree Conference, Quality Inn, Cypress Gardens, Winter Haven, FL, **May 14-15.** Contact Mrs. Taylor Burris, P.O. Box 16796, Temple Terrace, FL 33687, 813/985-8511.

Western ISA chapter meeting, Sacramento Inn, Sacramento, CA, **May 17-20.** Contact Ervin C. Bundy, ISA Executive Director, 5 Lincoln Square, P.O. Box 71, Urbana, IL 61801, 217/328-2832.

Quebec ISA chapter meeting, Hotel Auberge des Gouverneurs, Sherbrook, Quebec, **May 21-23.** Contact Ervin C. Bundy, ISA Executive Director, 5 Lincoln Square, P.O. Box 71, Urbana, IL 61801, 217/328-2032.

Northern Michigan Turf Managers Association meeting, Leland, MI, **May 19.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

Turf & Landscape Irrigation Institute Conference, Lake Arrowhead, CA, **May 29-31.** Contact J. L. Meyer, University of California, Dept. of Soil & Environmental Sciences, Riverside, CA 92521, 714/787-5101.

Refresher Course, Cal Poly, San Luis Obispo, CA, **June 2-4.** Contact Lanny E. Walker, California Association of Nurserymen, 1419 - 21st Street, Sacramento, CA 95814, 916/448-2881.

Kentucky Cemetary Association annual meeting, Executive Inn, Louisville, KY, **June 5-7.** Contact Lewis C. Tingley, Resthaven Memorial Park, P.O. Box 18068, Louisville, KY 40218, 502/491-5950.

Grow Show '81, Albert Thomas Convention Center, Houston, TX, **June 8-10.** Contact David H. Lindsay, Exposition Manager, P.O. Box 17413, Dulles International Airport, Washington, DC 20041, 703/471-5761.

Texas ISA chapter meeting, Dunfey Dallas Hotel, Dallas, TX, **June 11-13.** Contact Ervin C. Bundy, Executive Director, 5 Lincoln Square, P.O. Box 71, Urbana, IL 61801, 217/328-2032.

Northern Michigan Turf Managers Association meeting, Cadillac, MI, **June 16.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

Seventh Annual Turf Field Day, University of Massachusetts, South Deerfield Research Station, **June 24.** Contact Dr. Joseph Troll, University of Massachusetts, Dept. of Plant and Soil Science, Stockbridge Hall, Amherst, MA 01003, 413/545-2353.

Better Lawn & Turf Institute Annual Meeting, Atlanta, GA, **June 30.** Contact Robert W. Schery, Director, BLTI, 991 W. 5th Street, Marysville, OH 43040, 513/642-1777.

Continues on page 73

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Events *from page 70*

Northern Michigan Turf Managers Association meeting, Cadillac, MI, **July 7.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

New York State Nurseryman's Association Convention and Trade Show, Onondaga County War Memorial Convention Center, Syracuse, NY, **July 7-10.** Contact Margaret Herbst, 230 Park Ave., New York, NY 10017, 212/685-4579.

Grower's Seminar, San Jose, CA, **July 14.** Contact Lanny E. Walker, Public Relations Director, California Association of Nurserymen, 1419 21st Street, Sacramento, CA 95814, 916/448-2881.

American Sod Producers Association Summer Convention & Field Days, Hershey Motor Lodge & Convention Center, Hershey, PA, **July 15-17.** Contact ASPA, Bob Garey, Executive Director 9th & Minnesota, Hastings, NE 68901, 402/463-4683.

International Society of Arboriculture Annual Meeting, **Aug. 9-13,** Boyne Mountain Resort, Boyne Falls, Michigan. Contact E.C. Bundy, 5 Lincoln Square, P.O. Box 71, Urbana, IL, 61801, 217/328-2832.

Sixth Nebraska Turfgrass Field Day and Equipment Show, Aug. 4. Contact Dr. Robert Shearman, University of Nebraska, 377 Plant Science Bldg., Lincoln, NE 68583, 402/472-2550.

International Garden Centre Congress, Disneyland Hotel, Anaheim, CA, **Aug. 24-30.** Contact Pat Redding, GCA, 230 Southern Bldg., Washington, DC 20005.

Grower's Tour, Aug. 25. Contact Richard Staples, Program Administrator, California Association of Nurserymen, 1419 21st Street, Sacramento, CA 95814, 916/448-2881.

University of Rhode Island Turfgrass Field Day, Kingston, RI, **Aug. 26.** Contact C.R. Skogley, University of Rhode Island, Dept. of Plant Science, Woodward Hall, Kingston, RI, 02881, 401/792-2570.

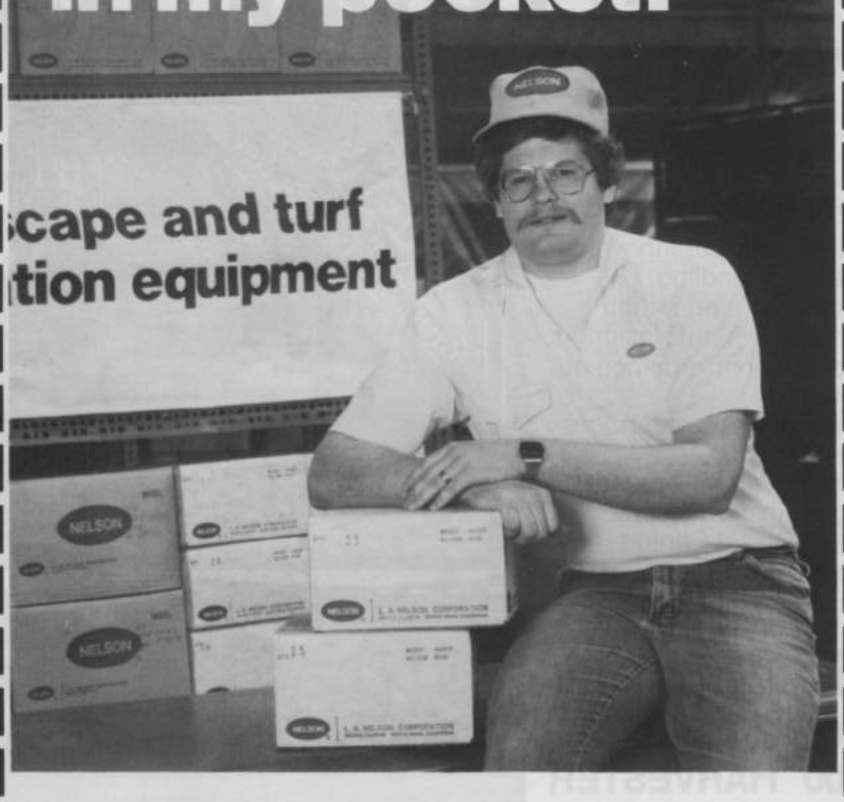
Northern Michigan Turf Managers Association meeting, Gaylord, MI, **Aug. 26.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

Ornamentals Northwest Seminars, Oregon State University, Portland Memorial Coliseum Portland, OR, **Aug. 28-29.** Contact Dr. James L. Green,

Continues on page 75

NELSON®

"This box of free heads is money in my pocket."



I cashed in on the Nelson Easy Winner (N.E.W.) bonus program.

Value is more than a matter of price. Even if I get my underground sprinkling equipment at rock-bottom prices, I can still lose money if I have to go back and replace faulty equipment.

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Nelson. The top line that can make your bottom line look a whole lot better.

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- New Cutter Head
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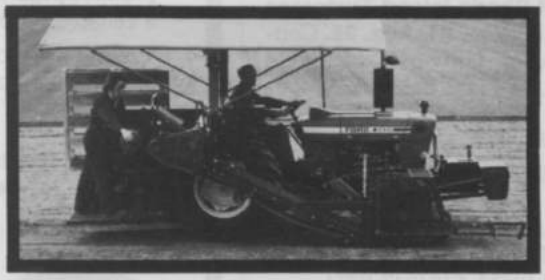

BROUWER

The Turf Equipment People

Brouwer Turf Equipment Limited, Woodbine Ave., Keswick, Ontario, Canada L4P 3E9 Tel: (416) 476-4311

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Events *from page 73*

Oregon State University, Dept. of Horticulture, Corvallis, Oregon 97331, 503/754-3464.

Garden Industry of America Conference & Trade Show, Pittsburgh Convention/Exposition Center, Pittsburgh, PA, **Sept. 10-12.** Contact GIA, Box 1092, Minneapolis, MN 55440.

Northern Michigan Turf Managers Association meeting, Acme, MI, **Sept. 15.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

Pacific Horticultural Trade Show, Long Beach Convention Center, Long Beach, CA, **Sept. 23-25.** Contact Lanny E. Walker, California Association of Nurserymen, 1419 - 21st Street, Sacramento, CA 95814, 916/448-2881.

Northwest Turfgrass Conference, Olympia, WA, **Sept. 28-Oct. 1.** Contact Dr. Roy L. Goss, Northwest Turfgrass Association, Western Washington Research and Extension Center, Puyallup, WA 98371, 206/593-8513.

Central Coast Turf Day, California Polytechnic State University, San Luis Obispo, CA, **Oct. 1.** Contact Ronald D. Regan, Head, Ornamental Horticulture Department, CPSU, San Luis Obispo, CA 93407, 805/546-0111.

Northern Michigan Turf Managers Association meeting, Pinconning, MI, **Oct. 6.** Contact C. E. "Tuck" Tate, President, NMTMA, 1147 Santo, Traverse City, MI 49684, 616/947-9274.

Horticultural Tour to China, Oct. 5-18. Contact Lanny E. Walker, Public Relations Director, California Association of Nurserymen, 1419 21st Street, Sacramento, CA 95814, 916/448-2881.

Southern California Turfgrass/ Landscape Equipment & Material Educational Exposition, Costa Mesa, CA, **Oct. 14-15.** Contact Ed McNeill, Southern California Turfgrass Council, 1000 Concha Street, Altadena, CA 91001, 213/798-1715.

Southwest Turfgrass Association Annual Conference, Albuquerque, NM, **Oct. 15-16.** Contact Arden Baltensperger, Southwest Turfgrass Association, New Mexico State University, Agronomy Dept., Box 3-Q, Las Cruces, NM 88003, 505/646-3138.

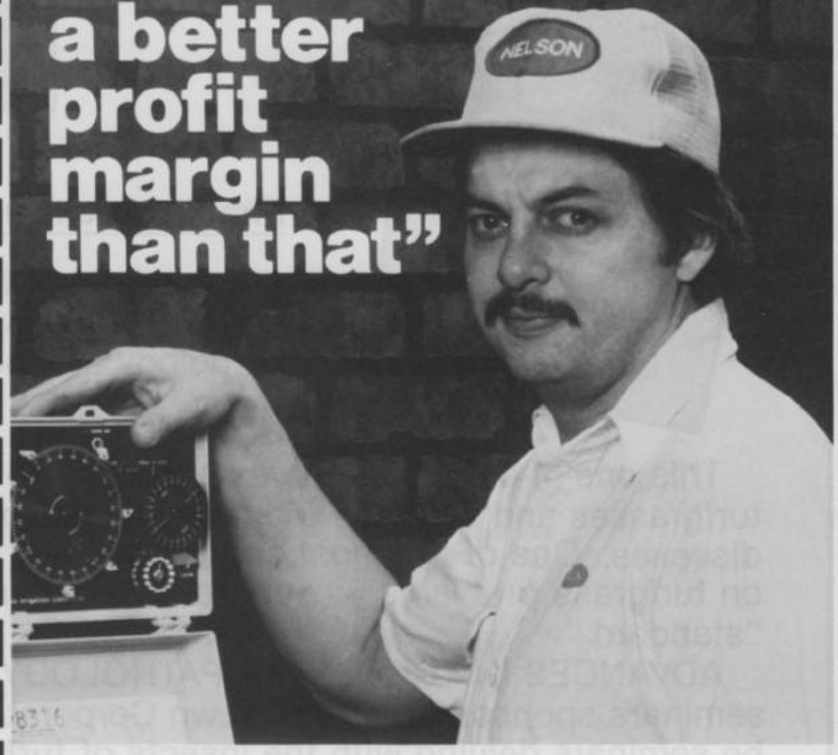
Florida Turf-Grass Association 29th Annual Conference and Show, Orlando, FL, **Oct. 18-22.** Contact Beth Eyman, FTGA, 1520 Edgewater Drive, Suite E, Orlando, FL 32804.

Continues on page 77

NELSON®

"I'm hanging a controller that I got free

You can't ask for a better profit margin than that"



I cashed in on the Nelson Easy Winner (N.E.W.) bonus program.

As a successful contractor, I have to watch profit margins. And you don't have to be a financial wizard to realize that selling and installing equipment that you get for free is about as profitable as you can get.

That's what Nelson's "easy winner" bonus program is all about. Not only do I qualify for a free controller with my purchase; but Nelson's dependability saves me time and money I'd have to spend down the road if I installed less reliable underground sprinkling equipment.

Take this ad to your distributor. Ask him about the N.E.W. warranty and how you can make some "easy money" as a Nelson "easy winner."

Nelson. The top line that can make your bottom line look a whole lot better.

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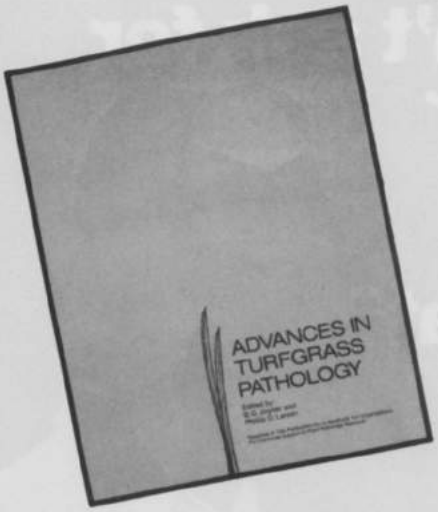
published by* HARCOURT BRACE JOVANOVICH PUBLICATIONS *in cooperation with Dr. B. G. Joyner, Dr. P. O. Larsen and Chemlawn Corporation



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WTT

Events *from page 75*

New England ISA chapter meeting, Sheraton-Wayfarer Inn, Route #3, Bedford, New Hampshire, **Oct. 18-20.** Contact, Oscar P. Stone, 84 Daniel Drive, New Haven, CT 06513.

C.A.N. Convention, Ventura Holiday Inn, Ventura, CA, **Oct. 20-22.** Contact Lanny E. Walker, California Association of Nurserymen, 1419 - 21st Street, Sacramento, CA 95814, 916/448-2881.

Interior Plantscape Association Annual Meeting, Radisson St. Paul Hotel, St. Paul, MN, **Oct. 28-30.** Contact IPA, 11800 Sunrise Valley Drive, Reston, VA 22091, 703/476-8550.

National Institute on Park & Management meeting, Appleton, WI, **Nov. 1-6.** Contact NIPM, Box 1936, Appleton, WI 54913, 414/733-2301.

Horticultural Tour to Australia and New Zealand, **Nov. 2-24.** Contact Lanny E. Walker, Public Relations Director, California Association of Nurserymen, 1419 21st Street, Sacramento, CA 95814, 916/448-2881.

The Irrigation Association Annual Convention, Honolulu, HI, **Nov. 9-13.** Contact Tom Schiltz, Director Technical Services, The Irrigation Association, 13975 Connecticut Avenue, Silver Spring, MD 20906, 301/871-1200.

15th Annual Clemson Turfgrass Conference, Clemson University, Clemson, SC, **Nov. 10-11.** Contact Dr. Landon C. Miller, Clemson University, Dept. of Horticulture, Room 161, P&AS Building, Clemson, SC 29631, 803/656-3403.

New York State Turfgrass Association Conference & Trade Show, Albany, NY, **Nov. 16-19.** Contact Ann Reilly, NYSTA, 210 Cartwright Blvd., Massapequa Park, NY 11762, 516/541-6902.

12th Annual GCSA/University of Georgia Turfgrass Short Course, Athens, GA, **Nov. 23-24.** Contact George M. Kozelnicky, University of Georgia, c/o Dept. of Plant Pathology & Plant Genetics, Athens, Georgia 30601.

Ohio Turfgrass Conference and Show, Columbus, OH, **Dec. 2-4.** Contact David P. Martin, Ohio Turfgrass Foundation, Ohio State University, 1827 Neil Avenue, Columbus, OH 43210, 614/422-2591.

Texas Turfgrass Conference, College Station, TX, **Dec. 7-9.** Contact Dr. Richard L. Duble, TTC, Soil & Crop Sciences Dept., Texas A & M University, College Station, TX 77843, 713/845-4826.

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When you're in the contracting business, you've got to keep one eye on the job . . . and the other eye on the bottom line. That's why I install the top line when it comes to underground sprinkling equipment: Nelson.

It's money out of my pocket if I have to do part of the job over because of product failure. With Nelson, I know that once it's in the ground, my job is done.

And with the discount I'm getting in their "easy winner" program, I'm practically guaranteed to make more profit this season.

Take this ad to your distributor. Ask him about the N.E.W. warranty and how you can make some "easy money" as a Nelson "easy winner."

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®BAYLETON. Superior control of fusarium blight. Preventive and curative action for many turf diseases.

Systemic action is the key to better disease control. And new BAYLETON 25% Wettable Powder fungicide has it.

New BAYLETON has been thoroughly tested and is highly recommended by university extension personnel. Its unique two-way action—both curative and preventive—gives the turf care professional a valuable tool to battle costly—and unsightly—fungus diseases.

BAYLETON handles the tough turf diseases; like Fusarium blight, snow molds, dollar spots and brown patch. And, BAYLETON also controls red thread, stripe smut and certain rusts. All without special handling. All with an economical low rate.

For even broader spectrum control, BAYLETON is compatible with ®DYRENE for control of helminthosporium.

Good residual activity means long-lasting control. That means fewer applications throughout the year.

Systemic action means control that moves quickly and evenly through turf grass for uniform disease control.

BAYLETON comes in 2-pound plastic containers that are convenient and safe to store.

BAYLETON is a product of the Agricultural Chemicals Division of Mobay Chemical Corporation. One of America's leading manufacturers of herbicides, fungicides and insecticides.

Also available for turf care from Mobay: ®SENCOR herbicide for broad spectrum weed control in established Bermuda grass turf*.

®NEMACUR nematicide for unmatched nematode control. And DYRENE foliage fungicide for effective disease control.

NEMACUR 3 is a RESTRICTED USE PESTICIDE.

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MOBAY

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Structures *from page 28*

Big Toys' eight-bike rack is made of wood and steel with both sides open for parking. Part of its frame is set in concrete.

a moving, flexible bridge which is suspended from an arched ladder composed of pipes and log foot supports.

This company also has a complex structure that includes five distinct play locations linked by a series of balance beams, a low catwalk with a handrail, and a horizontal ladder. The system is appropriate for children from late preschool to primary age.

Tables

Many new park and picnic tables feature bent legs that enable users to walk through without tripping. R. J. Thomas's 48-inch-square Pilot Rock park table is surrounded by four individual benches with back rests. A colorful umbrella provides shade from the sun and shelter from rain. The umbrella, which can be removed for storage, is seven feet in diameter and has crank-shaft tilting for positioning at various angles. The tabletop, benches, and back rests are of two-inch pressure-treated lumber.

Another Pilot Rock model is a six- or eight-foot picnic table with galvanized diagonal braces and center cleat that fastens the top securely.

Patterson-Williams's (327) standard and heavy-duty picnic tables are made with steel pipe frames and either maintenance-free anodized aluminum or preservative treated hemlock seats and tops. Widths are 6, 7.6, or 8 feet.

Patterson-William's picnic table features a heavy-duty square frame. Seats and tops are aluminum or hemlock.

Vandy-Craft treats its tables with a special stain to help guard against warping, grain-raising, and weathering. Its redwood barbecue sets have separate matching benches in 60-inch, 70-inch, or 94-inch lengths.

A unique redwood Combo Bench (#26) converts into a table when the back is folded down. It is bolted and screwed with rust-resistant hardware and measures 35″H x 70″L x 26½″W. A pair makes a full six-inch table-and-bench set.

Vandy-Craft also offers unfinished cedar-log and pine tables with kiln-dried tops and seats. Three standard tables have eight-inch seat boards: #21-C measures 30″ x 58″ x 30″; #24-C is 30″ x 70″ x 30″; and #25-C is 30″ x 94″ x 30″. The deluxe models have 36-inch tops and 10-inch seat boards.

GameTime's heavy-duty aluminum picnic tables are built to withstand abuse with minimum maintenance. The end frames are of 2⅜-inch O.D. galvanized steel pipe, ¾-inch larger in diameter than the company's standard model. Seats are 6, 8, or 15 feet long.

For extra comfort, there is GameTime's picnic table with seat backs. This one is made of cool-to-the-touch aluminum anodized slats of 2″ x 10″ wood and comes in 6- or 8-foot lengths.

And a wheelchair picnic table in aluminum or wood allows a handicapped person to join the fun. Its top extends 12 inches beyond the benches and has no obstructing posts or beams.

Bike Racks

Rally Racks (328) produces bicycle installations to encourage organized parking, prevent theft, and protect frames and wheels from damage. Model RR-30 accepts all bicycles and locking devices and secures the frame and both wheels with only a lock. It is constructed of heavy-duty steel and aluminum, coated and anodized for durability. A universal slot provides for special locks and chains.

A bike rack from Playworld Systems is easy to assemble and lags onto existing hard surfaces. The main framework is of 1⅝-inch O.D. galvanized pipe with ⅝-inch O.D. galvanized pipe. The unit is available in a 5-foot section with eight openings or a 10-foot section with 18 openings.

Playworld Systems also has a wood bike rack (B7803) to enhance a rustic environment. It accommodates 16 bikes, and the frame is made of 6″ x 6″ and 4″ x 4″ southern pine.

BigToys's eight-bike rack (PF-5) of wood and steel has both sides open for parking. Part of the frame is set in concrete to prevent bike theft.

Another rustic bike rack comes from GameTime. This model, No. 676, covers a ground space of 11′3″ x 3′1″, and its center rail uprights are of 6″ x 6″ pressure-treated yellow pine. Other racks by this company will accommodate up to 54 bicycles and are made of galvanized steel.

Landscaping Materials

Osmose K-33 pressure-treated wood has a light-green color that blends with the natural colors of

Continues on page 84

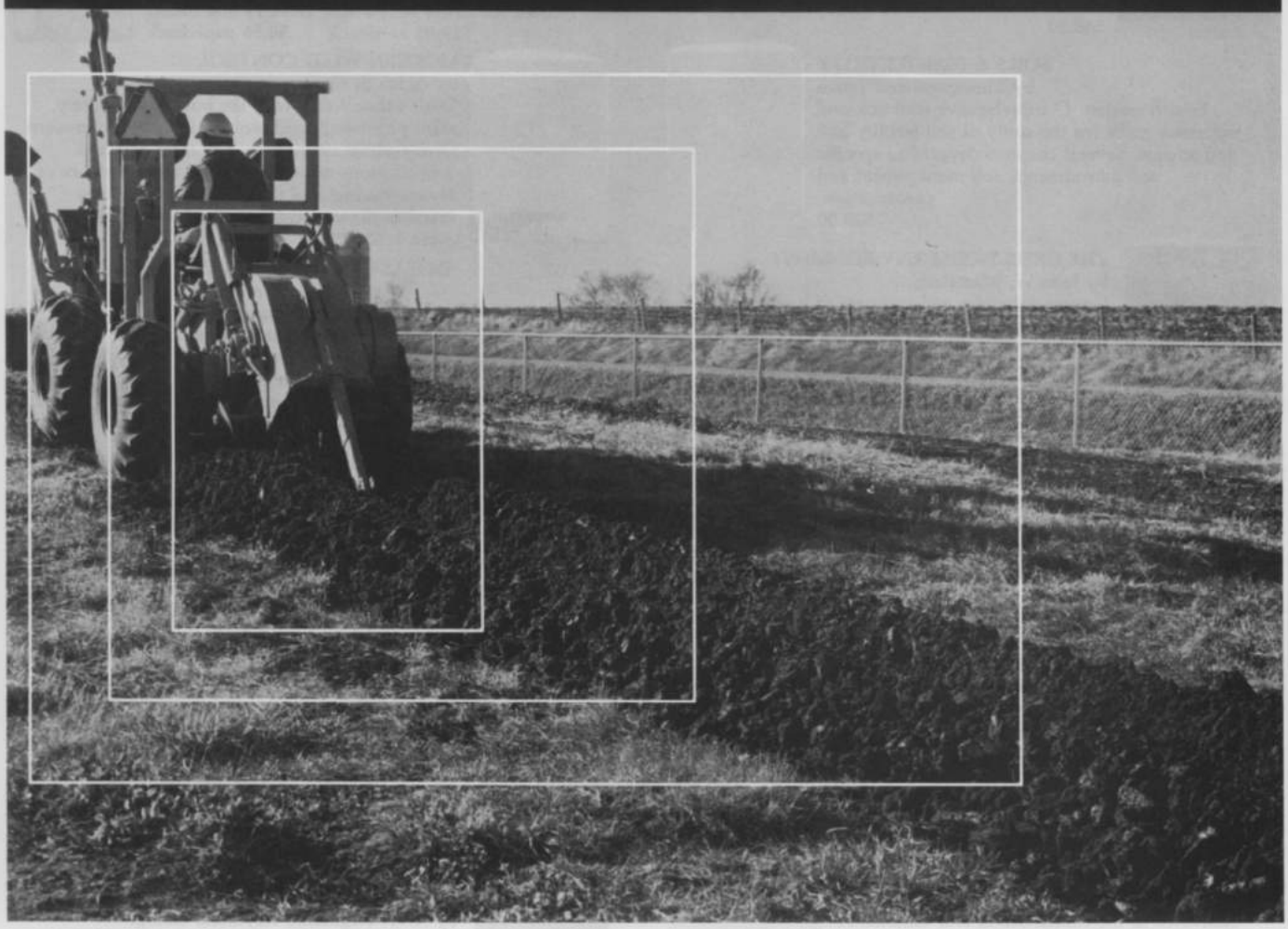
Try that with a backhoe.

In less than two minutes!

Don't get us wrong. For some jobs a backhoe is perfect. (That's why it's one of eleven different attachments you can add to this versatile Vermeer M-475 Trencher.) But when you're installing underground distribution systems, a backhoe can't keep up. It also can't offset trench next to buildings, or bury cable direct, or tamp soil, or dig through rock or concrete.

The Vermeer M-475 can. That's why many contractors use it. It does more jobs. It costs less to do them. It turns a greater profit. And that's why you're in business.

Next time you're looking for a machine that does more than backhoe, give Vermeer a call. We come equipped to do it all. See your local Vermeer dealer today.



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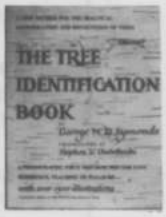

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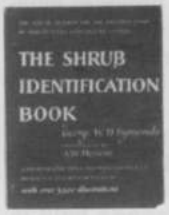

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WTT

Structures *from page 80*

shrubbery, flowers, trees, and grass. It provides long-lasting protection from rot and decay as well as termites. McArthur (329) supplies K-33 pressure-treated lumber, timber, ties, post, and poles for most any landscaping application.

Old Dutch Materials Company (330) presents Cobra, a polyethylene edging for lawn and garden care. Cobra is corrugated so it can be bent and shaped without loss of stability. Each corrugation forms a built-in pocket to hold the edging in place, and the double-barbed base anchors firmly to the ground. Another feature is an arrow ⅔ of the way down the flange which reduces frost-heave during a thaw.

Artistone, a new line of landscaping stone products by American Pelletizing(331), adds a final decorative touch around plants and borders, walkways, and pavilion areas. It comes in eight varieties, including marble, volcanic rock (lightweight), and strata (resembling tree bark), and an array of colors. Artistone products are packaged in ½-cubic-foot, cubic-foot, and 50-pound sizes.

As Paul Friedberg, a New York landscape architect, says, "There is an incredible quantity of pieces. In the last 15 years, we have had a richer, more exciting selection. There has been a major shift from metal to wood, which is warmer visually and physically." For the future, he sees a need for elegance, a move away from the block-like, "architectonic" designs. "We have become more sophisticated," he says. "The next step is an improvement of particular items and more subtlety of expression." **WTT**

Hahn

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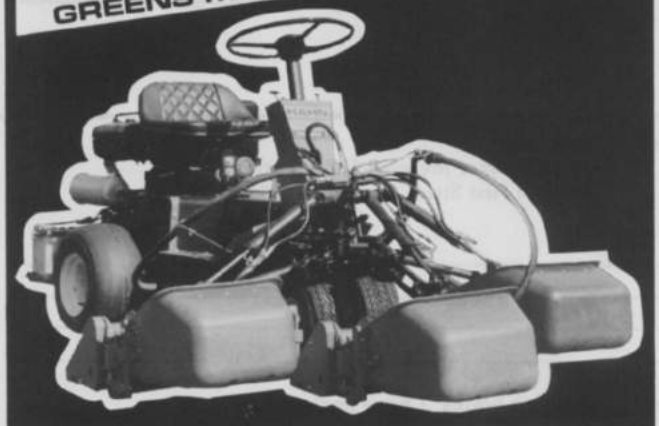

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Larry Farrell
Superintendent
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Maybe you can't see the difference. But since Holy Cross Cemetery added EMBARK plant growth regulator to its seasonal work force, they're doing 50 percent less trimming.

What started as a test is now a full fledged turf maintenance tool for Larry Farrell, superintendent of this 160-acre cemetery.

"By spraying EMBARK PGR on fast-growing grass around raised monuments, crews only trim 4 or 5 times a season," says Larry. "That's down from the usual 8 or 10 trips."

For Holy Cross a 50 percent drop in trimming means better use of part-time labor. Because if crews aren't cutting around markers, they're busy mowing or doing other cemetery maintenance jobs.

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It seems that more and more grounds maintenance professionals these days are switching to our Kubota tractors.

We are pleased by this development, but not surprised.

After all, Kubota is the world's largest manufacturer of mid-size tractors, 12 to 81 hp.

That means our tractors fall into the most desirable size, price, and horsepower range for your type of work.

And Kubotas are built to tackle grounds maintenance chores of almost every type.

Standard features include rear PTO, 3-point hitch, and a dependable hydraulic system.

Larger models, beginning with the 30-hp L305, have independent or live power.

Our tractors are therefore prepared to handle the implements you need for mowing, fertilizing, trenching, loading, hauling, and snow clearance.

To add to their capacity for hard work, all Kubota models are available with 4-wheel drive.

Besides all that, Kubotas have another very important advantage. They are amazingly trouble-free.

Quality construction is one of the reasons, but even more important is that every one of our tractors comes equipped with a tough, durable, water-cooled diesel engine.

Not only are diesel engines more economical than gasoline engines, they are also much easier to maintain.

For one thing, they never need a tune-up.

With no spark plugs, no distributor, and no carburetor, there's nothing to tune.

We are proud to have a large national sales network that is notable for its commitment and quality.

So for a good look at our leading grounds maintenance models, pay a visit to your local Kubota dealer.

He'll show you why owning a Kubota lets you spend your time maintaining the grounds, not the tractor.

KUBOTA

We're looking for work.

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Write **130** on reader service card

REBATE

"The Andersons will pay you $50 a ton to try any of our Tee Time fertilizers with insecticide."

Bob Scobee, Sales Manager

Bob Scobee

Now, in addition to saving time by feeding the turf and controlling insects in one application, you can save money, too. The Andersons will send you a rebate of $50.00 per ton or $1.00 per bag for all Tee Time fertilizers with insecticide delivered to you between July 1, 1981 and October 16, 1981.

The Andersons offers one of the broadest lines of fertilizers with insecticide in the industry. Carefully manufactured **Tee Time fertilizers are combined with either Dursban® or Diazinon.®** The effectiveness of both Dursban and Diazinon in controlling insects is widely known. And the outstanding performance of Tee Time fertilizers is well established. The various combinations of these proven performers provide a full line of products the professional can rely on for unbeatable results, time after time.

To get your rebate, all you have to do is complete the Proof of Purchase Rebate Certificate presented to you by your distributor at the time of delivery. Mail it along with a copy of the bill of sale or bill of lading to Bob Scobee, Sales Manager, The Andersons' Lawn Fertilizer Division. All rebate requests must be postmarked no later than November 16, 1981. Your rebate check will be mailed promptly—it's that simple!

If your present supplier does not carry The Andersons' Tee Time products, call us toll-free or write and we'll give you the name of your nearest distributor. You'll be glad you did.

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Dursban®
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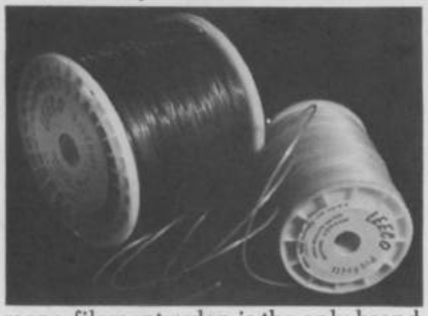
Write 102 on reader service card

WT&T PRODUCTS

Bulk nylon is available in spools of ½, 1, 3, and 5 pounds from Leeco. This



mono-filament nylon is the only brand with color coding for easy diameter identification.

Write No. 701 on reader service card

An insecticide, Dymet,® by Mallinckrodt, controls insects such as aphids, caterpillars, mealy bugs, mites, lacebugs, cankerworms, moths, and beetles on a broad range of ornamental plants. Dymet® should be applied at the rate of 2 to 3 quarts per 100 gallons of water at the first appearance of the insects, and again at intervals of 7 to 14 days as needed.

Write No. 702 on reader service card

An invigorator with a removable, all-steel feeder rod penetrates to 31 inches for deep-root fertilization. On the handle is a worm-gear flow control for easy, one-hand regulation of the liquid fertilizer. The rod has a 7/16-inch i.d. to assure fast, free flow, and it is easily cleaned or replaced.

Write No. 703 on reader service card

A lift rack, Nolan's Lift-Quik, raises (and lowers) lawn and garden tractors, snowmobiles, golf carts, and other service and recreation equipment up to 33½ inches for maintenance work at a

convenient level. Sturdily constructed of heavy gauge pipe and steel, the lift rack carries a maximum weight of 1,400 pounds. Track rails adjust from 24 to 40 inches for different widths of equipment. A safety chain offers protection in addition to the powerful winch that lifts and lowers the machinery.

Write No. 704 on reader service card

A seeding-mulching contractor can quickly and accurately figure his cost of

Continues on page 91

TREE TRUCKS

65 Just in. Come Early for Best Selection.

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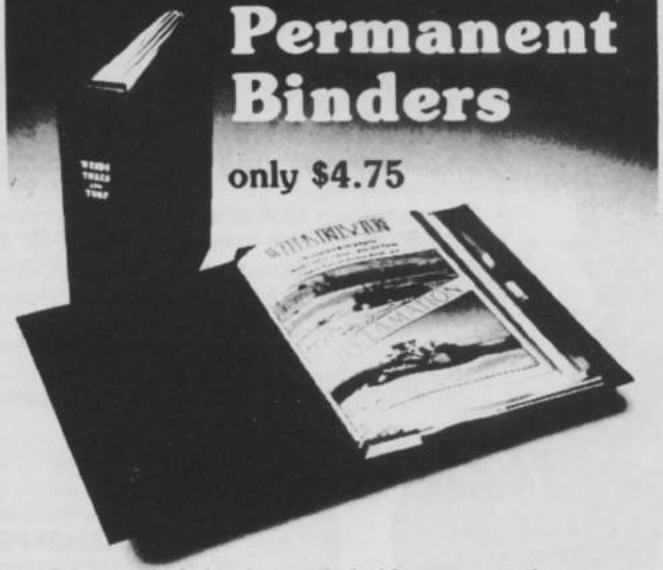

Custom-made binder easily holds entire year's copies of WTT magazine. Green binder with gold embossed logo protects your magazines and gives your library a neat appearance. Magazines can be inserted as they are received. Annual index in December issue makes it easy to find information you need quickly . . . Send check or money order to:

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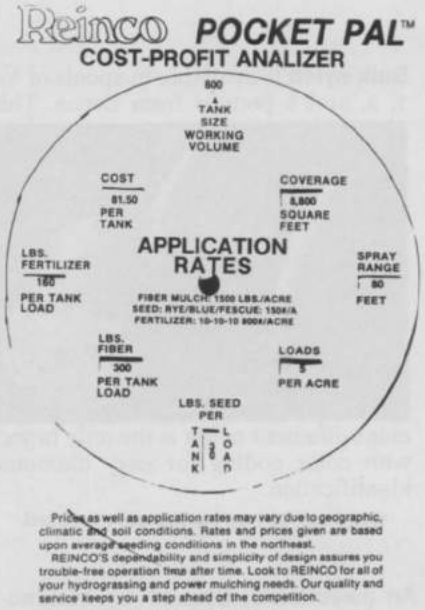
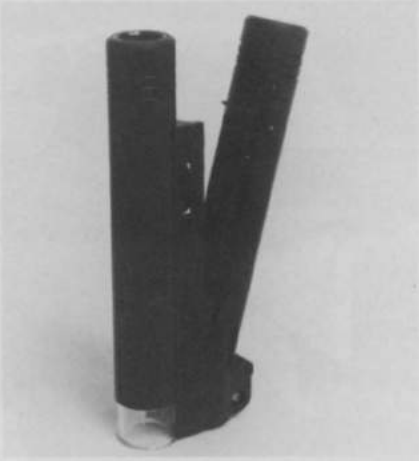
Products *from page 89*



material and labor with Pocket Pal. It is constructed of heavy-duty vinyl and fits in a pocket. The analyzer is waterproof, mar proof, and requires no wires of batteries. There is nothing to break or wear out. Pocket Pal handles jobs from as little as 1,000 square feet up to 10 acres or more in a few seconds. Reinco, Inc., makes it.

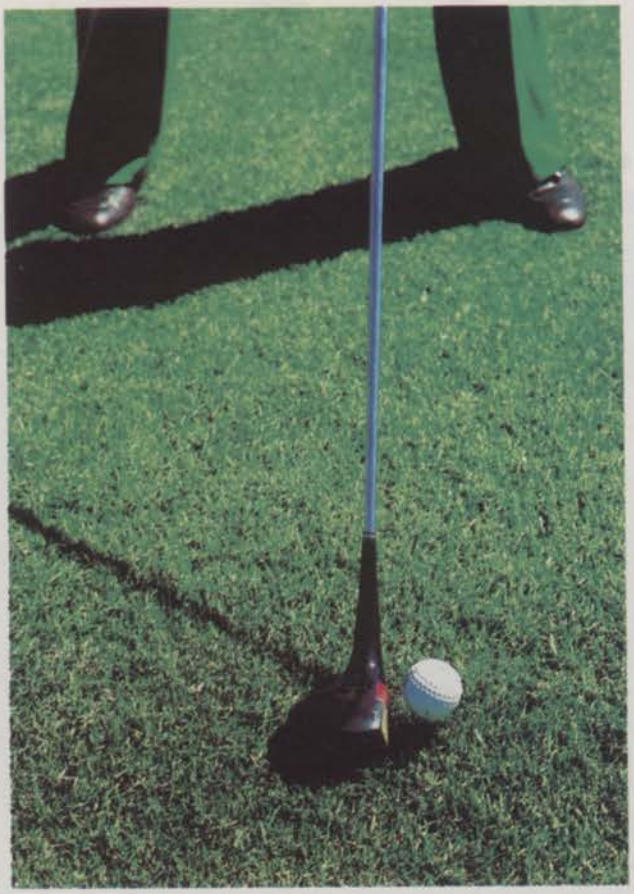
Write No. 705 on reader service card

Microscope with light, the Panasonic FF-393, helps identify and diagnose disease and insect problems under close scrutiny. It is a portable, precise,



and useful tool, magnifying images up to 30 times. Its light operates on two AA batteries; blue filter assures a distinct and vivid image. A switch mechanism turns the light on when the microscope

Continues on page 94



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Plant Variety Protection Number 7500003

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This is our answer!

Dr. William Meyer, Research Director, states: "At Turf-Seed, Inc., we set out to develop a turf-type perennial ryegrass with rapid establishment, good heat tolerance and the ability to maintain high quality throughout the hot summer months. We also wanted an attractive, dark green color and improved mowing performance. After years of cross breeding and testing, Turf-Seed developed Citation. I believe it comes very close to the specifications we were looking for in a fine-leafed ryegrass."

This unretouched photo from California demonstrates an advantage of including 20% Citation with an improved blend of bluegrasses. On the left is 100% Kentucky bluegrass damaged by Fusarium blight. On the right the Citation-bluegrass mixture shows little or no damage.

Citation had the highest average turf performance rating in a five-year test at Rutgers University. This excellent record has been confirmed by years of proven performance in applied use by turf professionals throughout the United States. Top-quality Citation seed is now available for your use.

"PROGRESS FROM THE GROUND UP"

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Please read label carefully, and use only as directed.

O® 26019

26019 against dollar spot (including benomyl-resistant dollar spot), Helminthosporium (leaf spot and melting out), brown patch, Fusarium blight and Fusarium patch (west of the Cascade Mountains). Chipco 26019 also suppresses grey and pink snow molds. Ask your Chipco distributor or Rhône Poulenc representative about effective, long-lasting Chipco 26019...the strong medicine in turf disease prevention. Rhône Poulenc Chemical Co., Agrochemical Div., Rhône Poulenc Inc. Monmouth Junction, NJ 08852.

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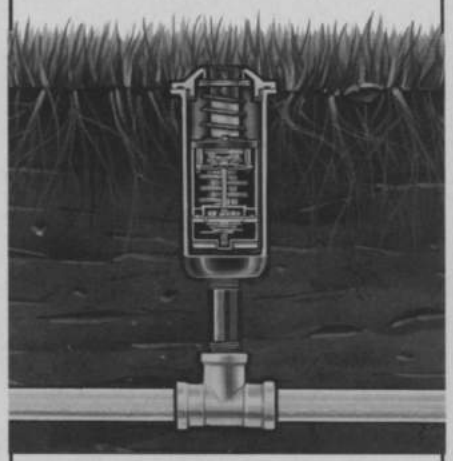
Underneath it all... Weather-matic, the hidden secret of beautiful landscaping.



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Write **158** on reader service card

body is unfolded, off when the body is closed. Thumbwheel turning knob provides smooth adjustment. It comes with a handy leatherette case from Advantage Distributors.

Write No. 706 on reader service card

A floating evacuation pump operates within two inches of water and can pass up to 3/4-inch diameter solids. It discharges water at a rate of 350 to 700 gpm. This Otterbine pump is equipped

with a 3.5 to 8 horsepower Briggs & Stratton engine. With no seals to wear out, it requires little maintenance.

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A skid-steer loader comes in the "New Breed" design from the Melroe Division of Clark Equipment Co. The 730 Series Bobcat is available with a gasoline or diesel engine and has a 1300-

pound operating capacity. At dump height, the models provide 4 inches more reach than the previous series. Different weight distribution results in better loader stability, bucket penetration, and steering control.

Write No. 708 on reader service card

Shovels for general use come with a 48-inch long handle or 40-inch D-top handle. Made by Ames from high-

strength poly, each Care-Free shovel is lightweight and has seven vertical ribs, non-stick blade, and rust- and scratch-proof finish.

Write No. 709 on reader service card

A gelling agent for containment and clean-up of liquid spills has been developed by United States Testing Company. Called SPILL/CLEAN, it is an

Continues on page 96

New Trailblazer™ cleans up to 7¼ acres per hour

Sweeps turf/hard surfaces

At last! A rugged all-terrain sweeper that can clean both your turf and hard-surfaced areas. Provides productivity undreamed of before. TENNANT® Trailblazer™ sweeps up to 3 acres of turf or 7 acres of hard surfaces an hour.

This tough, versatile sweeper combines the "lifting action" of a powerful vacuum with the "grabbing action" of a brush or paddle—to pick up paper litter, sand, cans, leaves, sticks, pine needles, even loose thatch. Has more pickup power than any turf machine. Cleans a 60" path

Cleans turf, hard surfaces. Climbs curbs to sweep hard-to-reach areas.

Pressure-packs debris to maximize hopper capacity.

(up to 92" with optional dual side brushes).

Climbs curbs—to clean hard-to-reach places. There's no faster way to sweep a variety of surfaces—turf, synthetics, concrete and asphalt—with a single machine. Its highly-efficient, ground-hugging sweeping is ideal for uneven surfaces too. Offers great maneuverability through articulated design. Solidly built—yet puts less PSI to the turf than lighter, less durable units.

A jet stream of air propels litter, pressure-packs it into the hopper.

Dumps its load at any point from ground level to 6 ft.—directly into containers or dump trucks. A 500 sq. ft. filter system provides nearly dust-free operation.

Optional cab enclosure and pressurizer for optimum operator comfort. Vacuum wand/blower available for cleaning along parking curbs, fences and other areas that might ordinarily require a separate specialized machine. Choice of gas or diesel engine. For a free, colorful brochure, write: Tennant Company, 701 N. Lilac Dr., P.O. Box 1452, Minneapolis, MN 55440.

Dumps from ground level to 6 ft.—directly into containers, dump trucks.

Write **159** on reader service card

organic powder which absorbs and solidifies most liquids, including polar and non-polar organics, halogenated hydrocarbons, organic and inorganic acids or bases, and aqueous solvents.

SPILL/CLEAN works without potentially dangerous chemical reaction. During the gelling process, it forms a sticky solid that can be applied to small ruptures for a temporary Band-Aid. The product is available in 25-pound fiber drums.

Write No. 710 on reader service card

Potting units called "Trans-plant" are for transplanting and shipping delicate seedings without damage, shock, or

wilting. Trans-plant is a soil substitute made of a tested peat moss-vermiculite-nutrient mixture which is bound into a sponge-like section of polyurethane foam. It consists of a pliable, three-dimensional network, in triangular shape, and provides air for root formation while maintaining proper moisture levels through capillary action.

A half-inch slot in the center of the unit allows insertion of cuttings, bare-root seedlings, or seeds. Transplanting is done by separating the triangles and planting them level with the soil line in the pot. This product comes from Tree, Inc., of Twin River Engineering.

Write No. 711 on reader service card

A rotavator, Howard Rotavator Co.'s Model HE is an improved version of the Model E. This one is available in five tillage widths from 50 to 90 inches. It is suitable for a wide range of primary and secondary tillage operations, including seedbed preparation, weed control, chopping and mixing crop residues, and inter-row cultivation. The new features include a double hull for extra strength and protection against damage, an improved topmast to protect the gearbox from shock loadings, and a parking stand which eliminates

tip-over risk during storage.

HE rotavators are designed for mounting to tractors in the 45-to-80 PTO horsepower range. Those in 50-, 60-, and 70-inch widths require a 540 rpm PTO speed, while the 80- and 90-inch sizes are recommended for 1,000 rpm PTO.

Write No. 712 on reader service card

A data sheet is available on the Hannay Series 1500 reels for lawn care service, pesticide spraying, steam cleaning, and wash-down operations. The Hannay 1500 reels handle 3/8-inch i.d.

Continues on page 98

MEDALLION

Wood Waste–Problem or Opportunity?

Grind leaves, bark, chips or brush for fuel, compost, or just reduced volume.

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FELDMANN COMBINATION TILLER—AERATOR

• 18" rotary garden tiller digs deep for a finely tilled seed bed • 15½" power lawn aerator penetrates turf, promotes thatch deterioration, allows water, air and fertilizer to reach grass roots for lush, green lawn • Dependable chain drive powered by rugged, reliable 2-hp Briggs & Stratton engine • Lightweight, easy handling; fold-down handle for compact storage and transportation

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Sheboygan Falls, WI 53085
414/467-6167

Write **119** on reader service card

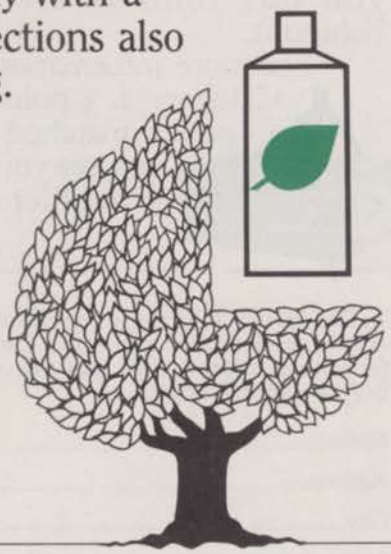
An announcement of major importance to utilities and tree companies.

In tree growth control, time saved is money saved. Now you can increase your cost effectiveness and on-the-job efficiency by using Atrinal®, a new, injectable tree growth retardant that can extend your tree trimming cycle by one year or more.

After trimming, Atrinal solutions can be injected into the trunks of common broadleaf tree species such as sycamore, silver maple, eucalyptus, cottonwood, London plane, and water oak to provide effective, long-term growth retardation. Arborists will find Atrinal especially useful in maintaining utility rights-of-way, city streets, parks, and similar areas. Treatments can be made quickly with a pressurized injection system. And Atrinal tree injections also eliminate many problems associated with spraying.

Today, effective tree growth control demands a reliable product. Trust Atrinal as a practical means of reducing the frequency of manual trimming. To get all the facts, see your distributor or write–

Maag Agrochemicals Marketing,
Hoffmann-La Roche Inc., Nutley, N.J. 07110

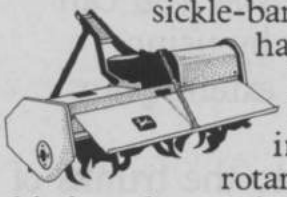


Maag
Atrinal
FOR TREE INJECTION

RCD 6074

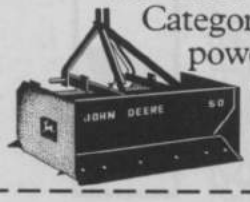
Even if you don't own a John Deere tractor, you can still have John Deere behind you.

John Deere offers a full line of quality-built implements to fit nearly any make of small diesel tractor with a Category 1 3-point hitch. For example, there are four mowers: a grooming mower for smooth, even cuts; a rotary cutter for rough terrain; a flail mower for trashy conditions; and a sickle-bar mower for roadsides and hayfields.



For landscaping, John Deere has hitch-mounted implements including a rotary tiller, a box scraper, a rear blade and a post-hole digger. Of course, we also have a full line of hitch-mounted farm implements. So even if your tractor isn't green, you can make it do more when you put John Deere behind it.

For more information about John Deere Category 1 3-point hitch implements power-matched to small diesel tractors, see your John Deere dealer or send for a free leaflet.



To find out how John Deere implements can increase the versatility of your small diesel tractor with a Category 1 3-point hitch, send for a free descriptive folder. Mail this coupon to John Deere, Dept. B147, Moline, IL 61265.

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JOHN DEERE

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hose up to 700 feet long or 1/2-inch i.d. hose up to 500 feet. The rewind mechanism is either a direct crank with the crank permanently attached to the reel axle, or a chain and sprocket drive powered by an electric or compressed air motor. An adjustable spring drag device brakes the reel.

The Series 1500 sheet provides information for matching reel to application. In easy-to-read chart form, it gives capacity, model number, dimensions, and weight of the five reel models.

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Irrigation pipes are flexible, lightweight conduits that make underground pipe mains for solid-set sprinkler or portable and semi-permanent

systems. These PIP-PVC pipes from Johns-Manville have 80 and 100 psi ratings, are large in diameter, and come in 20-foot laying lengths for flood, furrow, or drip irrigation systems.

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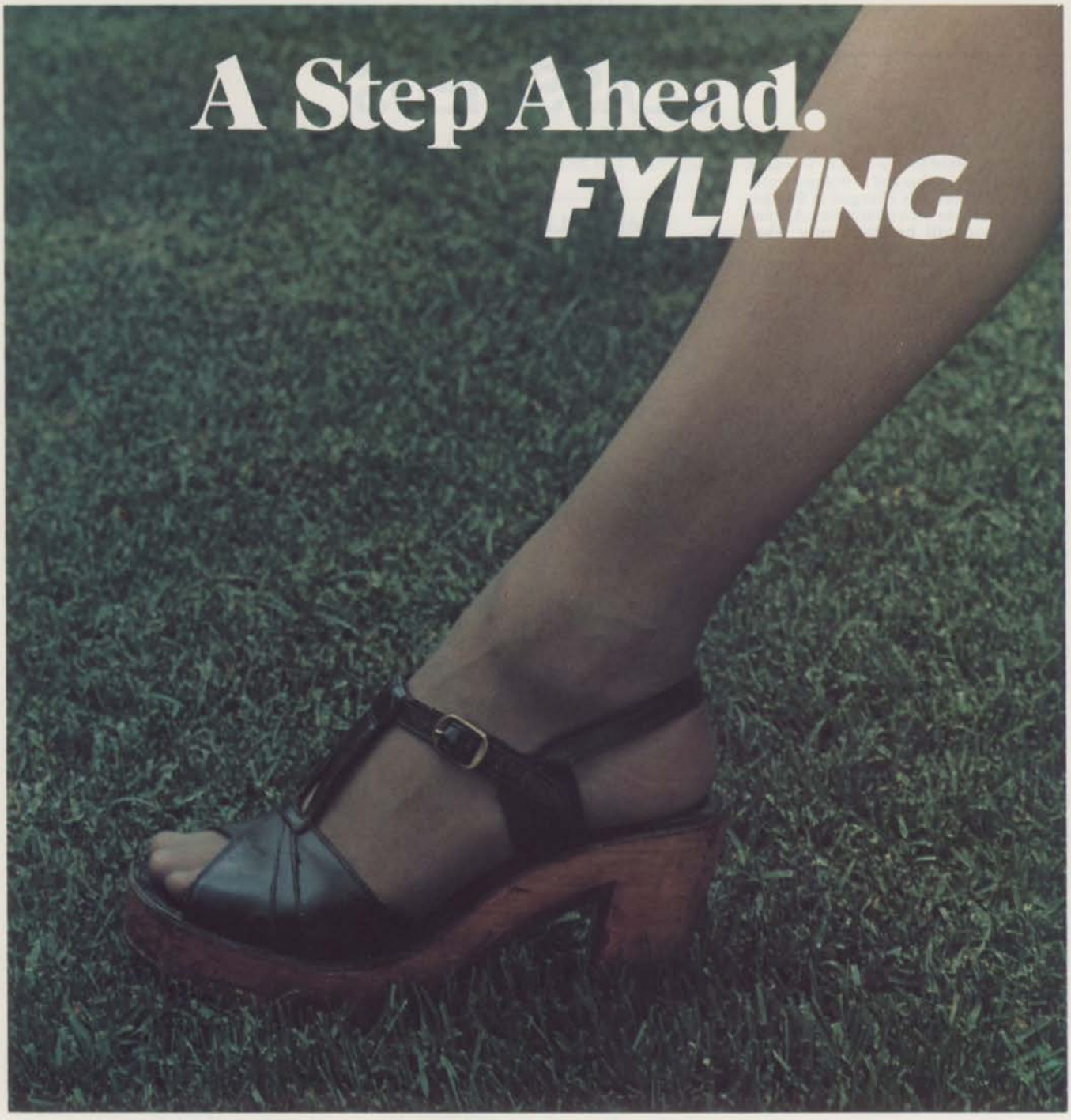

When this low-growing, Swedish lawn beauty first stepped into the turf world it revolutionized the lawn industry.

Now another step! Fylking Kentucky bluegrass costs less than most other elite bluegrasses!

Fylking establishes fast, develops a greater density of rhizomes and root system. Fine-textured, velvety green, Fylking performs well when cut low (even low as one-half inch), and may need less mowing. Amazingly tough, Fylking Kentucky bluegrass has improved disease resistance to leaf spot, stripe smut, stem rust and leaf rust, as rated in tests by many major universities and institutions. Physically pure, genetically true seed, Fylking contains no annual bluegrass (Poa annua), bent grass or short-awned foxtail.

Take a giant step ahead by using Fylking as the backbone bargain of your next lawn turf mix. Ask for the Swedish beauty, Fylking Kentucky bluegrass at your local wholesale seed or sod distributor.

FYLKING KENTUCKY BLUEGRASS U.S. Plant Patent 2887

Another fine, quality-controlled product of Jacklin Seed Company.

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RATES: 70 cents per word (minimum charge, $15). Bold face words or words in all capital letters charged at 80¢ per word. Boxed or display ads charged at $60 per column inch (one inch minimum). Agency commissions will be given only when camera-ready art is provided by agency. For ads using blind box number, add $5 to total cost of ad. Send ad copy with payment to Dawn Anderson, WEEDS, TREES & TURF, 1 East First Street, Duluth, MN 55802.

BOX NUMBER REPLIES: Mail Box number replies to: WEEDS, TREES & TURF, Classified Ad Department, 120 W. 2nd St., Duluth, MN 55802. Please include box number in address.

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WANTED: Working partner for established Washington D.C. lawn care business, only $40,000 minimum investment needed. Write WTT Box 268. 5/81

REAL ESTATE

REAL ESTATE: Central New Jersey — 180 acre Sod Farm for sale. Land, Building, Equipment & Inventory. Financing available. Write WTT Box 269. 4/81

FOR SALE

COLORADO NURSERY, established 8 years, year-round business with snow plowing. Building and land also available. Sales ½ million. Terms available. Call (303) 476-3047 weekdays. 4/81

MONSANTO KRILIUM soil conditioner several 200# drums for sale .85 per pound MITCHELL SEED AND GRAIN, BX 279, Roswell, NM 88201. 4/81

LAWN SEED. Wholesale. Full line of top quality grasses. Improved bluegrass varieties, fine fescues and fine bladed ryegrasses. We specialize in custom mixing. Oliger Seed Company, 2705 Wingate Avenue, Akron, Ohio 44314. Call collect (216) 753-2259. 1/82

FOR SALE: **NEW EQUIPMENT** - Root-Lowell hand crank hose reels, $75.00 ea; 10 g.p.m. piston pump w/accessories $350.00; Hamilton spray guns, $25.00 - $35.00 Ph. (309) 691-8257. 4/81

BUSINESS OPPORTUNITIES

WANT TO BUY OR SELL a golf course? Exclusively golf course transactions and appraisals. Ask for our catalog. McKay Golf and Country Club Properties, 15553 N. East Street, Lansing, Michigan 48906. Phone (517) 484-7726. TF

LANDSCAPE AND TURFGRASS MANAGEMENT: Obtain the expertise to start and/or manage a landscaping or lawn care business. For information on our two year program contact The Institute of Applied Agriculture, University of Maryland, College Park, MD 20742. (301) 454-3938. 6/81

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Prepare now to increase next year's profits. "Garden Tips" the monthly customer newsletter with your company name/phone. Proven response . . . cements customer relations, gets them to spend more, opens new doors expertly in new expansion areas. Low cost, effective profit building. Call today (516) 538-6444, we'll send complete information or write: Garden Tips, Box 117, Garden City, NY 11530. TF

START YOUR LANDSCAPING CAREER NOW! Write: School of Landscape Design and Sales, Lake City Community College, Rt. 7, Box 42, Lake City, FL 32055. Fully accredited and V.A. approved. 7/81

LANDSCAPE DESIGN KIT, 37 rubber symbol stamps, ink pad, $38.50 postpaid. California add $2.16 tax. Stamp kit brochures available. T-Gordon's, Box 741, Dept. WT, Reseda, California 91335. (213) 881-2808. TF

KELWAY® SOIL ACIDITY TESTER, used by PROFESSIONALS nationwide. Direct reading, lightweight, portable, fully serviceable, no power source. Model HB-2 reads moisture too. Available through distributors. For brochure contact Kel Instruments Co., Inc., Dept. T, P.O. Box 1869, Clifton, N.J. 07015. (201) 471-3954. 4/81

TREE PROBLEMS-Botanical, legal and appraisals. For directory of members of American Society Consulting Arborists in U.S. and Canada, write: Executive Director ASCA, 12 Lakeview Avenue, Milltown, N.J. 08850. (201) 821-8948. 6/81

DIESEL HI-RANGER TOWERS—50-100 Feet working heights. Daily, weekly, monthly rentals-with or without operator. **MATLOCK LEASING,** Pottstown, PA **(215) 326-7711.** 5/81

NEW/THE WICK-IT WEEDKILLER. Lightweight hand-held wick applicator. Low herbicide usage. Johnsongrass and other weeds growing among desirable plants. $24.95 plus $2.00 for handling. Send for brochure. Plant Production, Rt. 7, Box 441 E, Fort Worth, Texas 76119. 5/81

ARE YOU A PROFESSIONAL GROUNDS MANAGER? If you work on Grounds in any capacity, you need the Professional Grounds Management Society! This is a group of people just like yourself who think professional. They are interested in upgrading themselves and the industry by working together. For information on how you can become a part of the team write: PGMS, Dept. WTT, 7 Church Lane, Pikesville, MD 21208. 4/81

WANTED TO BUY

Wanted Used Sod Harvester. Prefer roll style. State age and price. Write WTT Box 265. 4/81

Wanted: 630 Vermeer Stump Grinder. 12" or 16" Asphlund or Mitts & Merril Chipper. Carl Kopocs, 3190 Cooper Foster Pk., Vermilion, Ohio 44089. Phone (216) 988-4478. 4/81

Wanted to buy: Used stump cutter prefer Model 665A; mist blower. Contact Kincaid Tree Surgery of Wyoming, 1116 Hugur Ave., Cheyenne, WY 82001, (307) 634-5061. 4/81

WANTED TO BUY: Used Bucket Trucks and/or Chippers in good condition. Forty five foot Asplundh or Skyworker with Isolators. Call (607) 692-4712. 4/81

HELP WANTED

WANTED: Firewood Distributors for energy conservations company. Inventory investment range — $2000 to $10,000 — depending on location. Serious replies to: HOME FIREWOOD, P.O. Box 141 Sta. B., Hamilton, Ontario L8L 7O7 Canada.

FORESTER OR HERBICIDE SPECIALIST with utility R/W experience. A progressive national utility contractor has an opening for a herbicide expert experienced in utility ROW maintenance. Assignments include sterilant, foliage and dormant spraying, inhibitor work and testing of new herbicides. Extensive travel required. Equal opportunity employer M/F. Salary commensurate with experience. Write Asplundh Tree Expert Company, Chemical Div. P O Box 505, Willow Grove, Pa. 19090. 4/81

Irrigation Supervisor: Previous experience in installation and supervision of irrigation crews essential. Excellent opportunity to join a well established Landscape and Irrigation Company. Excellent salary and future for enthusiastic individual with experience. Send complete resume to Shelton & Son Landscaping, P. O. Box 5013, Kansas City, Missouri 64132. 4/81

Course Superintendent - Central Florida - based landscaped contractor seeks highly-qualified golf course superintendent to head new Golf Course Contract Maintenance Division. Successful candidate will have 3 yrs. experience as Head Superintendent of course in Southeastern U.S., and must demonstrate formal management skills. Please direct confidential resume and salary history to: Mr. E. Gray Payne, 1930 Silver Star Road, Orlando, Florida 32804. 4/81

WANTED - MANUFACTURER'S REPRESENTATIVE, SEMI-RETIRED, OR NEED TO ADD A PROFITABLE NEW LINE: AEROSOL INSECTICIDES, RODENTICIDE, PYRETHRIN INSECTICIDE, NEW PATENTED FIRE ANT CONTROL SYSTEM, PATENTED FLYING INSECT CONTROL SYSTEM. CALL FRED KESSLER OR GRADY QUERY (704) 375-9824 OR WRITE CESSCO, INC., 1109 CENTRAL AVE., CHARLOTTE, N.C. 28204. 5/81

"Person to develop and expand central Florida sod farm. Should have some management experience and be familiar with warm season grasses. Send resume to WTT Box 267." 4/81

Continues on page 105

Small In Stature BIG IN FEATURES

At Ditch Witch, "smallest" does not mean "least capable." The Model 2200 is our smallest horsepower, rider-type machine. But, it's loaded with features that are traditionally found only on bigger equipment.

Packed with Features...

This little 18-HP class trencher has a lot to offer: a big 57-inch wide, fully hydraulic backfill blade; hefty premium cord drive belts, reinforced with aramid fiber; rugged, rigid-frame construction; and three-speed, 4-wheel drive; just to mention a few.

Designed for Convenience...

The 2200 requires very little operator training time: steering and operating controls respond to your "natural instinct," just like a pick-up; trenching visibility is line-of-site, right over your shoulder; maintenance and inspections are simplified by quick access covers; and...the list does go on.

A Lot for the Money...

Yes, the 2200 is small. It's less than 6 feet wide and 7 feet high and weighs less than 3,000 pounds. But by the pound, by the feature, or by the dollar, we think you will find it to be the most economical to own or the most practical to rent of any riding trencher in its class.

Contact your Ditch Witch dealer for a free demonstration. Call Toll Free (800) 654-6481 or write for more information on the 2200: Charles Machine Works, Inc.; P.O. Box 66, Perry, Oklahoma 73077.

DITCH WITCH® IS THE ANSWER.

Ditch Witch and ⊕ are registered trademarks of the Charles Machine Works, Inc.

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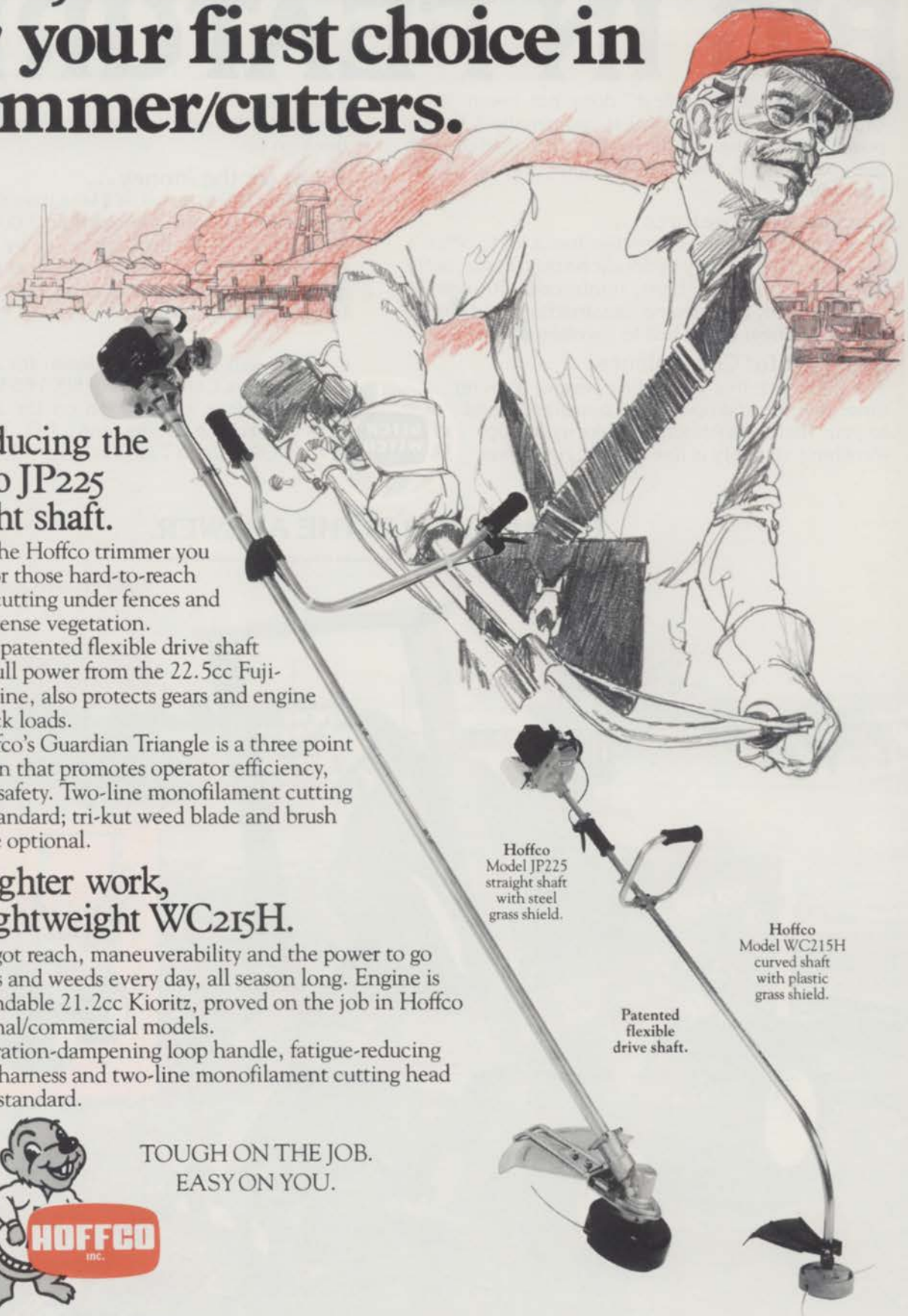
Now, a second choice in shafts for your first choice in trimmer/cutters.



Introducing the Hoffco JP225 straight shaft.

It's the Hoffco trimmer you wanted for those hard-to-reach jobs like cutting under fences and pruning dense vegetation.

Our patented flexible drive shaft delivers full power from the 22.5cc Fuji-robin engine, also protects gears and engine from shock loads.

Hoffco's Guardian Triangle is a three point suspension that promotes operator efficiency, comfort, safety. Two-line monofilament cutting head is standard; tri-kut weed blade and brush blades are optional.

For lighter work, our lightweight WC215H.

It's got reach, maneuverability and the power to go after grass and weeds every day, all season long. Engine is the dependable 21.2cc Kioritz, proved on the job in Hoffco professional/commercial models.

Vibration-dampening loop handle, fatigue-reducing shoulder harness and two-line monofilament cutting head all come standard.

TOUGH ON THE JOB.
EASY ON YOU.

HOFFCO inc.

HEAVY DUTY

Hoffco, Inc. ● Dept. No. WTT/481 ● 358 N.W. F St. ● Richmond, IN 47374

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Classifieds *from page 102*

Commercial Landscape contractor in Houston, Texas, seeks top level individual to establish and manage our landscape maintenance division. If you are experienced in all phases of plant and lawn care, dedicated to your profession, quality oriented, and for one reason or another not satisfied with your current situation, we want to hear from you. Benefits and salary will exceed your expectations. Send resume to WTT Box 266. 4/81

USED EQUIPMENT

Used spray trucks—Chevy, 750 gallon tanks, automatic hose reels, mechanical agitation. Limited quantity. Call (513) 845-0517. 5/81

Jacobssen Rogers model 548-100 seeder. 3 point hitch, PTO, 2 years old. Used very little. Located in Southern Mississippi. Will crate to ship. $2,500. Call K. Floyd 601-452-7231 for further information. 4/81

FOR SALE: Ryan 30" Renovaire aerator, $600.00; Ryan 6' Tracaire aerator $1200.00. **WANTED:** Vermeer 665 stump grinder. Steve Flournoy, Richmond, VA. (804) 264-1322. 4/81

BRAND NEW 1980 TRUCK. Ford 1 ton long wheel base chassis with the following equipment: 10' steel floor bed with hoist, 56" steel grain sideboards, lift-gate, under carriage tool boxes. Under 200 miles and unused! Phone 419-225-4111. 4/81

LOCKE MOWER —2 years old. 75" cutting with reverse. New Rochelle, New York (914) 235-4429. 4/81

Tree Business-Dump chipper truck, 12" Asplundh chipper, GMC 3/4 ton 4 WD, Vermeer stump remover 2460A, Dodge pickup, Ford dump, 7 chain saws, etc. All good condition $30,000, owner disabled, must sell. (215) 485-4905. 4/81

FOR SALE: Bucket Trucks, Line Trucks - Chippers. Write P O Box 247, Linton, IN 47441, or phone (812) 665-2362. 4/81

AERIAL BUCKETS, call Aerial Hydraulic Equipment, Essex, Conn. (203) 767-1636 — For brush chippers, Vermeer stumpers, sprayers, Hydro-Ax's, log loaders available for immediate sale, call P.C. Gould Sales Company, Plains Road, Essex, Conn. 06426. (203) 767-1636. 7/81

HI-RANGERS AERIAL BASKETS 65', 57', and 53'. Skyworkers aerial baskets 65', 50', 40'. Vermeer stump cutter 1560, 6. Vermeer tree spade 66, TS 44. Asplundh bucket and brush chippers. Bean sprayer, 9 ton trailer. Parkway Tree Service, 12026 W. Cherry, Wauwatosa, Wisc. 53226. (414) 257-1555. TF

NICE: Ryan 12"-18" and 24" sod cutters. Also have field automatic sod pickup and loading conveyer. All in A-1 shape. 1-513-424-2052. 4/81

SALE: 65' Arlo Crane with Ladders on 1972 GMC Truck, 18' Bed, Front and Rear Outriggers, Air brakes, very nice — $9800.00, also, 50' Strato-Tower, 2-man Aerial Bucket — Factory rebuilt on 69' Ford Truck with Motor Overhaul and New Paint — $11,500.00. Eastcoast Crane, Inc. (201) 922-9393. 4/81

60" YAZOO MOWER. Twin cylinder, 18 horsepower. Excellent condition. Phone 419- 225-4111. 4/81

SKYWORKER BUCKET TRUCK - Series 1045, 1971 Ford 700; Unit has all maintenance records, truck has good tires, body, and engine; 5 speed, PTO, hydraulic Fairmont saw, dump box, cabinets. VERY GOOD CONDITION. WOODS TREE SERVICE - Akron, Ohio (216) 644-2166 5/81

SALE - 80' Arlo Crane - excellent condition - no truck - $7,000. Eastcoast Crane Inc. (201) 922 9393 5/81

KUBOTA TRACTOR. 16 horsepower, 4 wheel drive, includes loader and bucket, 4' rotovator, 3' many pulverizer, 5' york rake with scarifier, grader blades and adjustable wheels. Has ballast boxed. Phone 419-225-4111. 4/81

1978 JACOBSEN G-10 TRACTOR with 5-gang mowing unit. Excellent condition. Under 200 Hours. $12,000.00 McCormick Properties, Inc., Hunt Valley, Maryland 21031. (301) 667-7741. 5/81

Finneyfrock Big Brute sod cutter. Newly reconditioned $1000.00. Green Valley Turf Farms, Inc., Box 163, Canfield, Ohio (216) 533-3354. 4/81

Dico Side-O-Matic traveling boom unloader. 12' boom 48" forks. Like new. $5200.00. Green Valley Turf Farms, Inc., Box 163, Canfield, Ohio (216) 533-3354. 4/81

FOR SALE: Bowie HydroSeeder on Tandem Trailer, 800 Gal. capacity with 25 h.p. Wisc. Engine. In very good condition, ready to go to work. $7500.00. Can be seen at GFE, Clearlake, Mn. (612) 743-2255, Randy. 4/81

For Sale: Mitts & Merril Chipper 4 cyl 12", excellent condition $2995.00. Asphlund Chipper Head with P.T.O. $1600.00. Asphlund Chipper with No motor $1600.00. Edwards Tree Service, 49090 Cooper Foster Pk., Amherst, Ohio 44001. Phone (216) 988-4477. 4/81

FOR SALE: Gandy 10 ft. spreader, excellent condition. $700.00 (517) 627-2820. 5/81

Lely Turf Shaper, 5' w/seeder box, 8 hrs, $3800.00 firm. Ford 6' disc, 1 yr old, excellent condition, $850.00 firm. Brutus Power Roller, 3 hp Model A-Z, 1 yr old, $750.00 firm. Rotor tiller, 3 pt hitch for 1655 Massey Garden Tractor, $500.00. Above equipment all excellent condition. Call (312) 395-3856. Write: Eslinger Landscaping, Rt. 2 Box 221-E, Antioch, IL 60002. 4/81

"18" RYAN SOD CUTTER, with sulky roller, in excellent condition, original owner. Long Sod Farms, Jefferson, WI. (414) 674-2226. 5/81

1974 Skyhook Crane 100HD on GMC 7500, welder/generator, tool boxes, 2 man bucket, working daily. $21,500. 1970 Vermeer 1560 stumper, recently rebuilt. $4500. Page Hill Corp., Winterport, Maine 04496, (207) 223-4655. 4/81

HI-RANGER BUCKET TRUCKS, 54' and 51', Flatbed and chip box mitts - Merrill brush chipper. Allied Enterprises, Inc., W. 204 N. 11509 Goldendale Rd., Germantown, WI 53022, (414) 255-6161 anytime. TF

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Drive disease off fairways too, with Daconil 2787.®

Daconil 2787 Flowable Fungicide is the product of choice on tees and greens because it controls more diseases than any other turf fungicide. And in 12 years of continuous use, resistance has never been reported.

You can count on it to perform on fairways, too. To help you achieve a longer, more profitable playing season. A better looking course. More enjoyable play. Plus a better return on course investments already made.

Daconil 2787 controls such turf ravaging diseases as dollar spot, leaf spot, red thread and large brown patch on fairways. Its proven residual effectiveness at recommended application rates, plus the fact Daconil 2787 has a built in surfactant, makes it economical to use.

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Always follow label directions carefully when using turf chemicals.

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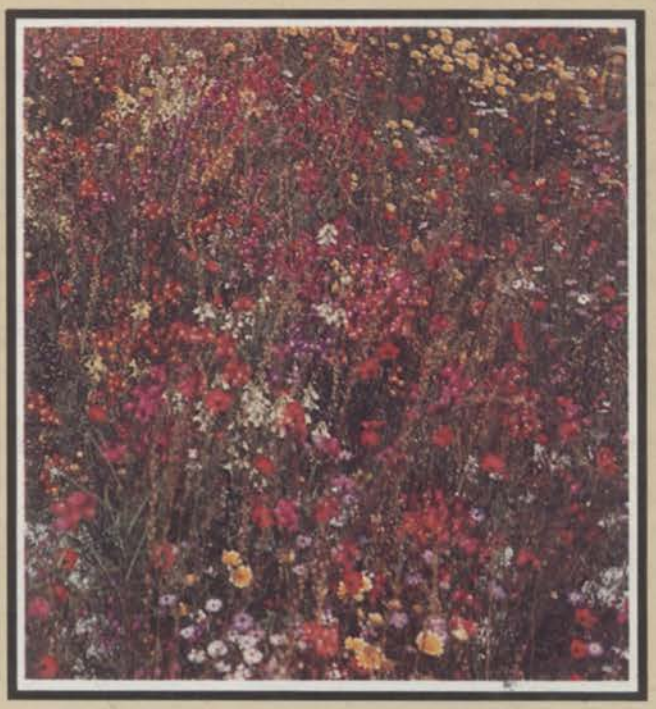

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the colorful and decorative answer for low maintenance landscape areas.

A multi-colored blend of annuals and perennials like Chicory, Scarlet Flax, Bachelor's Button, Baby's Breath and Painted Daisy. A blend that reseeds itself for lasting beauty year after year.

Pinto is ideal for any landscape — parks, roadsides, golf course roughs, home gardens, industrial and landfill sites. And perfect for areas where you don't have to mow.

Available either as 100% wild flowers, or mixed with a fescue as a Meadow Mix to aid soil stability.

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